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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 93 JANUARY, 1921 NO. 1

EDITORIAL

WELCOME, 1921.

Another annual cycle has been completed since, with the initial number of the Ninety-second Volume, we stood "On the Threshold of 1920" and extended to our readers and friends *Best Wishes and Hearty Greetings* and expressed the hope that the new year we were then entering upon would bring to them an abundant measure of Prosperity and Happiness. So thoroughly occupied have we been in the interim that we have scarcely noted even the succession of the seasons, but the rapid flight of time has brought us to another year of service and the initial number of another volume of the AMERICAN JOURNAL OF PHARMACY affords the opportunity of offering once more to our contributors and readers our Heartiest New Year Greeting.

The door has closed upon the events of 1920, yet, ere committing these to the realms of past history and to memory, we would fain take a parting view. We are cognizant of the fact that, while there have been many disturbing factors that caused the neglect of some of the Nation's opportunities, it has, nevertheless, been a year in which a goodly measure of substantial advancement has been made. The trend of the sciences and arts has been progressively upward and that of commerce and the industries has been toward a cessation of the speculative and the establishment of a sane basis of profit as a proper foundation for future advances. The drug trade has had its share of the prosperity as well as the perplexing trials of the period of readjustment and, on the whole, pharmacy has made wholesome strides in the right direction. We believe that the AMERICAN JOURNAL OF PHARMACY has contributed

its quota of service and we are thankful for the increased encouragement and support that has been accorded.

It is not our *forte* to peer into the crystal globe or to acquire a prophetic vision of what the year 1921 has in store. We acknowledge that we are imbued with optimism. A nation that is credited with 25 per cent. of the world's production has such a start on the highway of prosperity that, with but the exercise of customary energy and ingenuity coupled with the ethics of fair business, it should readily maintain its lead. We salute the new year. We welcome 1921 as another year of great opportunities with prospects of ample reward.

Let us impress upon our readers that to pharmacy will come its share of possibilities and the success and progress of our professional and trade interests during the year will be dependent entirely upon the energy and the concerted efforts of organized pharmacy. As we celebrate this year the centennial of the establishment of pharmaceutical education in America, it would appear that this was to be a year of golden opportunity for pharmacy. We earnestly appeal to every member of our calling to turn a new leaf; to this year honor pharmacy as never before and to be an honor to its ideals. We pledge anew the utmost efforts of the oldest pharmaceutical journal in America toward advancing the interests of pharmacy and making 1921 a year of phenomenal success.

With the commencement of this year we are pleased indeed to note the increased circle of contributors, patrons and readers, and to express our appreciation of the kindly interest manifested in our endeavors and our indebtedness to these for the broader field of usefulness thus placed at the command of the "Journal." We are happy to extend once more to all our sincere *Best Wishes* that 1921 will prove to be a year of unbounded Happiness and Prosperity.

G. M. B.

THE TREASURY DECISION ON TINCTURE OF GINGER.

Under date of November 16, 1920, the Commissioner of Internal Revenue issued the following declaration as Treasury Decision No. 3092.

"To the Federal Prohibition Directors and Others Concerned:

"On and after ninety days from the date hereof U. S. P. Tincture of Ginger, whether sold as Jamaica Ginger, Essence of Ginger, Extract of Ginger, or by whatever other name known, is hereby classed as a U. S. P. alcoholic preparation fit for use for beverage purposes, and may be manufactured, sold, transported and used only in the manner provided for other similarly classified official preparations listed in Section 60 (b) of Regulations No. 60 and Prohibition Mimeograph No. 87.

"Section 94 (a) of Article XVII of Regulations No. 60 is hereby revoked.

"An alcoholic extract of Tincture of Ginger made in accordance with the process described on Page 469, Ninth Revision of the U. S. P. will be classed as unfit for use for beverage purposes, provided the quantity of Ginger Root used is as follows:

"Jamaica Ginger No. 30 Powder, 400 grams to make 1000 milliliters."

We are heartily in accord with the principle of prohibition that aims to prevent the use of alcoholic liquors as beverages and the misuse of medicinal preparations for such purpose. Nevertheless, we are compelled to question the wisdom of this departmental promulgation and likewise the authority for such an action.

Our contention has been always that the wording of Section 4 (b) of Title II of the Volstead Act was unfortunate, confusing and impracticable of enforcement, and until this error was corrected the medical and pharmaceutical professions, as well as the legitimate users of alcoholic liquid medicines will be subjected to continuous annoyance, hardships and the danger of prosecution. To legislate that medicinal preparations manufactured in accordance with formulas prescribed by the United States Pharmacopœia, National Formulary or the American Institute of Homœopathy must be "unfit for beverage purposes" is destructive to the art of pharmacy. Moreover, it is an inhuman indifference to the health of the people and savours of fanaticism instead of the prudent legislation expected of an American Congress.

Fitness is an attribute, a quality of a substance or preparation, that it is impractical to legislate against, but the improper use of such a substance or preparation is a proper and practical subject for legislative prohibition. No one doubts the "fitness" of water for drowning any human being, yet it would be the height of folly and ridiculous for Congress to enact that water must be rendered "unfit" for drowning before it could be consumed for the necessi-

ties of life. The intent of the legislation undoubtedly was *to prohibit the use of all alcoholic medicines for beverage purposes and all uncertainty could have been eliminated and the object attained if the advocates of prohibition had contented themselves with Congressional enactment of a prohibition of the purchase, sale, use, or possession of any alcoholic medicine, made by any formula,* either in the authorities named or by any other recipe, *for beverage purposes.*

Fitness is a question of individual opinion or taste that should not be incorporated in a law and much less handed over to a department for interpretation and enforcement. It is the sole duty of Congress to legislate on national questions and at times Congressmen and Senators have been greatly exercised over the encroachments of the executive departments upon the functions of the legislative bodies. Yet Congress has only too often itself stimulated departmental aggressions and bureaucratic government by engaging in the popular Washington game of "passing the buck" in leaving matters that should be determined in the enactment to rules and regulations to be framed by the enforcement division of one of the executive departments. Under these conditions the departments of the Government have assumed the authority to interpret the law and to frame rules and regulations that exceed ofttimes a fair construction of the enactment.

Congress cannot delegate its powers to legislate to any department and the granting of authority to frame appropriate rules and regulations for the proper enforcement of an act does not empower a department to make interpretations of the law. In a recent decision the Court again held "that the power given to a commissioner to frame rules and regulations gave no authority to make rulings interpreting the law and that any person relying upon any interpretation of the law made in a departmental ruling does so at his peril." In the same opinion it was again affirmed that "the meaning of the act is authoritatively determined by the Court and not by the Treasury Department."

The drug trade and the prohibition enforcement officers have joined in the endeavor by twistings, verbal gymnastics and subterfuges, and by interpretations of the language of this Section 4 not in harmony with the dictionary meaning of the words of the Act, to make the impracticable feasible. Would it not have been wiser

and more to the interest of all concerned if Congress had been frankly advised that this section of the Act was impracticable, inimical to health and public welfare and destructive of an essential industry in which alcohol was the most important raw material? The relief that is needed from the entangling and contradictory language can be afforded only by the law-making body and these forces should be united in urging upon Congress the necessity for a clarifying amendment that will permit the drug trade to carry on its legitimate manufacture and dispensing of medicines and the further development and progress of such an essential industry.

At the hearings held in Washington in December, 1919, it was at once apparent that the officials of the prohibition enforcement division assumed that, by virtue of the authority given in Section 1 (7) of the Volstead Act to the Commissioner of Internal Revenue to prescribe regulations for carrying out the provisions of this Act, they were empowered to determine what formulas of the United States Pharmocopœia, National Formulary or the American Institute of Homœopathy are fit for beverage purposes. The indictment of the eighteen official formulas subsequently listed in Regulations 60, Article XI, Sec. 60, was then foreshadowed. The medical and pharmaceutical professions were unexpectedly confronted by a new proposition by which the authority of these legally adopted works was to be questioned. Standard formulas constantly prescribed as remedial agents or as vehicles for medicines could, on the opinion of an official who might be but temporarily in office and without any special knowledge of the subject, be declared as fit for beverage purposes. *That the fitness of a preparation for perversion to improper use and not such improper use was to determine the possibility of its continued use as a medicine.* Some of the formulas so listed had never been viewed by the drug trade as possible tipples. The department realized that many of the formulas so listed were essential to the present methods of medical practice and so the officials assumed that they not only had the power to declare these as coming within the meaning of Section 4 as "not unfit for beverage purposes," but that they likewise had authority to declare that their manufacture could be undertaken

with non-beverage alcohol, but that the distribution and use of these must be under the same regulations as intoxicating liquors.

In T. D. 3092, the officials have gone one step further in assuming that they had the authority to modify a formula of the Pharmacopœia and to promulgate another formula as a standard. We believe that this a pure assumption and entirely without foundation of law. In the past, Congress has consistently denied to the enforcement officials the right to make standards and we fail to note anywhere in the Volstead Act that any such authority is vested in the Commissioner of Internal Revenue. Moreover, Congress, in the Federal Food and Drugs Act, made the standards and formulas of the U. S. Pharmacopœia and the National Formulary the legal standards for drugs and medicines and we do not concede that the Volstead Act or any other enactment has repealed this or placed it within the power of any department of the Government to either modify or nullify any of the provisions of that Act.

It becomes a matter of rather serious import when an official assumes that he can by edict undermine and destroy the authority of the Pharmacopœia and set aside any of its formulas. In this promulgation the Treasury Department is advising an infraction of the Federal Food and Drugs Act under which tincture of ginger entering interstate commerce must comply with the standard of strength and quality laid down in the United States Pharmacopœia and in following the provisions of this Treasury decision any person does so at his peril and doubtless could be prosecuted for violating the Act of June 30, 1906.

Since the pharmacopœial revision of 1880, tincture of ginger has been maintained at a 20 per cent. drug strength and evidently this, in the opinion of the medical and pharmaceutical specialists composing the committees of revision that successively passed upon this question, was the correct strength for a medicinal preparation. The Pharmacopœia is concerned solely with standards for medicines and its tincture of ginger is not intended as a culinary flavor or for any other purpose than medicinal.

If there are any reasons whatever why the formula for tincture of ginger should be changed after forty years' standing, such reasons should be presented to the committee of revision and the standard

changed by the proper procedure. As chairman of the sub-committee on tinctures the writer will welcome all suggestions for modifying the formula and will assure that these will receive careful consideration. He must, however, protest against any attempt at revision by departmental edict.

From the information at hand we are of the opinion that the officials of the Prohibition Enforcement Division were badly advised and the action of the Commissioner of Internal Revenue in the issuing of this decision was based upon insufficient evidence. The intent of this decision, to prevent the consumption of tincture of ginger as a beverage, is commended. If the tincture of ginger produced by any manufacturer was sold or consumed for intoxicating beverage purposes then it became the duty of said manufacturer to correct his methods of sale so as to prevent such illicit use, or accept the responsibility and become liable for the penalties provided in the law.

The proposition to denature this tincture by doubling the amount of drug contained may have been presented in a plausible manner, but we have no confidence in its effectiveness. It is doubtful if double the amount of ginger root can be extracted in accordance with the process described for the making of tincture of ginger in the U. S. P. Likewise, whether such a double strength preparation would be entirely suitable for medicinal purposes. Physicians at times have complained that the present official tincture of ginger is too strong. Moreover, by dilution with water and the use of a filtering medium, such double strength tincture can readily be made potable.

By revoking Section 94, paragraph (a) of Article XVII, Regulation No. 60, the restriction that Jamaica ginger may not be sold by retail druggists or other persons to the consumer in quantities exceeding one or two ounces at one time is rescinded and the unrestricted sale of the proposed double strength tincture of ginger will hereafter be permitted. There is every reason to believe that this will defeat the very purpose for which T. D. 3092 was promulgated. Already the druggists are being importuned by manufacturers to purchase ample supplies of this double strength tincture. With the unrestricted sale to be permitted this is prone to become

the most commonly used booze throughout the country, as by this decision it is classified as "unfit for use for beverage purposes" and may be sold promiscuously by any person.

The intent of the Volstead Act is to restrict the distribution of intoxicating liquors and alcoholic medicines to the licensed pharmacists and if this intent was carried out the distribution could be controlled and the illegal use of alcoholic liquors would be more promptly eliminated.

G. M. B.

ORIGINAL PAPERS

THYMOL AND CARVACROL PROBLEMS.*

By D. C. L. Sherk.†

EXTRACTION OF THE PHENOLS FROM ALKALINE SOLUTION.

In the separation of the phenols from the volatile oil of *Satureja hortensis,* L. Jahns [1] in 1882 first extracted the oil with 10 per cent. sodium hydroxide; recovered the phenols by acidification with hydrochloric acid, and again dissolved them in an equal volume of 15 per cent. sodium hydroxide. When this alkaline solution was extracted by shaking with ether repeatedly until nothing more came out, a phenol was removed which was proven to be carvacrol. This was *completely* removed from the alkaline solution by ether. Another phenol remained as completely in solution.

In 1899 Klages [2] made the observation, very interesting to him, that carvacrol as well as the isomer thymol can be removed from alkaline solution by steam distillation; and he also confirms Jahns' observation that the alkaline solution of the phenol could not be purified by extraction with ether; since the phenol is removed likewise. According to him, other phenols would not distill from alkaline solution.

* From the laboratory of Edward Kremers.
†Fritzsche Bros. Fellow.

[1] Jahns, Ber. 15 (1882), p. 817.

[2] Klages, Ber. 32 (1899), p. 1517.

Raikow and Momtschillow [3] found that, among a considerable number of phenols, carvacrol and thymol are precipitated from alkaline solution by carbon dioxide. Of course, that would correspond to their inability to decompose carbonates to form phenol alkali derivatives. Following this up Raikow [4] studied a large number of phenols to determine their acidity and, among the various solutions employed as reagents, ammonia was found to dissolve carvacrol with no precipitation of a solid compound. Toward thymol it behaved in a similar manner. For this work, thymol was emulsified with warm water and this emulsion was employed in the tests. Water-glass was the only salt solution found that dissolved carvacrol, and in it the phenol is soluble to a considerable extent. There is no formation of a solid compound or precipitation of silicic acid. Thymol dissolves in water-glass also. Since these phenols are insoluble in carbonate solutions the solubility above cannot be attributed to alkali (carbonate), in the silicate. Perhaps this conclusion of Raikow should be modified, when it is considered that these solutions react distinctly alkaline and that hydroxide may actually exist in the solution. However, among the salt solutions one distinction between carvacrol and thymol was observed. Thymol is soluble in a solution of normal potassium phospate, K_3PO_4; while carvacrol is not.

Following Jahns' and Klages' observations, Stoermer and Kippe [5] found that the sodium compound of carvacrol may be extracted as such from 30-40 per cent. sodium hydroxide solution directly with ether. Thymol, and several other phenols mentioned, have the property of being extracted from alkaline solution with ether, petroleum, ether, ligroin, benzene, carbon disulphide and chloroform as the free phenol in only very small amounts.

In 1915 Boyd [6] determined the degree of hydrolysis of sodium phenoxides in aqueous solution in an attempt to determine their relative acidity. The method of Shields,[7] depending upon the rate of hydrolysis of methyl acetate, was adopted. In order that the

[3] Raikow and Momtschilow, Chem. Ztg., 26 (1902), p. 1237; through J. C. S., 841 (1903). p. 162.

[4] Raikow, Chem. Ztg., 27 (1903), pp. 781, 1125.

[5] Stoermer and Kippe, Ber., 36 (1903), p. 3992.

[6] Boyd, J. C. S., 107 (1915), p. 1538.

[7] Schields, Zeit. phys. Chem., 12 (1893), p. 167.

results might be compared with earlier work the hydrolysis was measured in $N/32$ solution. The sparing solubility of some of the phenols made it necessary to employ solutions of much lower concentration and, since the hydrolysis constant was found to diminish somewhat with increasing dilution, a modified formula was used $\frac{x^2}{(1-x)V^{7/8}} = \text{constant}$, instead of $\frac{x^2}{(1-x)V} = K_h$, for calculating the observed results to a concentration of V_{32}.

RELATIVE ACIDITIES OF PHENOLS AT 25°.

	K_h at V_{32}.	Percentage hydrolysis at V_{32}.	K_a.
Phenol	0.000104	5.60	1.15×10^{10}
Carvacrol	0.000267	8.83	0.45×10^{10}
Thymol	0.000373	10.34	0.32×10^{10}

K_h is the hydrolysis constant for the sodium derivatives at 25° and V_{32} dilution. For carvacrol and thymol this was not obtained directly, but was calculated from the degree of hydrolysis by means of the formula

$$\frac{x^2}{(1-x)V} = K_h.$$

In column 2 are given the degrees of hydrolysis of the sodium derivatives of V_{32}, and the values for carvacrol and thymol were calculated from data obtained at higher dilution by means of the modified formula. Column 3 contains the dissociation constants K, for the free phenols in aqueous solution at 25°, calculated from the hydrolysis constants, according to the equation $K = \frac{K_w}{K_h}$, K_w, the dissociation constant for water, being taken as 1.2×10^{-14}. The mean value for phenol calculated at the dilution at which it was determined becomes 1.26×10^{-10}, agreeing well with Walker's value of 1.3×10^{-10}.

In 1885 Lustig[8] prepared the sodium derivative of carvacrol by dissolving this phenol in 4 to 5 volumes of petroleum ether (b. p. 50-60°) and adding sodium. A lively evolution of hydrogen took place with a rise in temperature and a flocculent precipitate appeared. This dried to a fine white crystalline powder which decom-

[8] Lustig, Ber., 19 (1886), p. 11.

posed on addition of water or acids liberating carvacrol. On analysis by conversion into carbonate it gave the value for sodium of 13.64 per cent. The calculated value is 13.36.

In the laboratory the sodium derivative of both carvacrol and thymol were prepared in heptane and in ether. About ten grammes of the phenols were dissolved in 100 Cc. heptane and metallic sodium added. Carvacrol reacted with a slow evolution of hydrogen and a closely adherent coat formed on the metal. This liquid became reddish in color and a layer of the flaky precipitate adhering to the glass assumed an intense blue color. The bulk of the precipitate was of a pale color. Thymol caused an immediate more lively evolution of hydrogen and the temperature rose to 30-40°. The solution remained clear for a time and as soon as the first turbidity of crystals appeared the action began to slow down at once. This may be attributed to the fact that the phenols form complexes with the phenolates, the alkali derivatives.

Thus in 1903 Gentsch [9] obtained a patent on a process for obtaining double compounds of phenols with phenol alkali derivatives. These compounds result on treating the phenols, with or without an indifferent solvent, with alkali carbonates, caustic alkalis, or phenol alkali compounds, and were used for separation and isolation of phenols from mixtures. These crystalline derivatives may be washed and separated by progressive and differential solubility. Phenol forms a compound of the type $C_6H_5OK,_3C_6H_5OH$, crystallizing from benzene or alcohol. Cresol also forms a complex. The existence of such a soluble complex may explain the effect of the addition of more thymol which dissolves the precipitate first formed.

The action of sodium on the phenols in ether was different from that in heptane. Ether which had stood over sodium was employed as a reaction medium using about the same quantities as for heptane. Sodium was added to the flask attached to a reflux condenser. Carvacrol developed the reddish color immediately and the action was so vigorous that the ether boiled. The sodium compound began to crystallize out as slender colorless prisms about a centimeter long. They were filtered off and placed in a lime desiccator where they became opaque and the edge became rounded, and the faces assumed a vitreous appearance. They quickly turned brown.

[9] Gentsch, D. R. P. No. 156 (1903), p. 761.

The ethereal solution was allowed to evaporate partially and the crystals filtered at the pump and dried as well as possible in a vacuum desiccator. The analysis indicates that excess carvacrol from the mother liquors remained on the crystals.

I. 0.7340 Gm. gave 0.2303 Gm. Na_2SO_4.
II. 0.6685 Gm. gave 0.2070 Gm. Na_2SO_4.

Sodium calc. for $C_{10}H_{13}ONa$.	Found.
Per cent.	Per cent.
13.36	I. 10.16
	II. 10.03

The crystals were dissolved in ether and this solution diluted with benzene and the ether allowed to evaporate. The sodium compounds slowly turns greenish in the air. It dissolves in ether with absorption of heat. With loss of ether fine, colorless prisms appeared and were filtered at the pump; washed with benzene to remove excess of carvacrol and dried in a vacuum.

The melting point of these crystals was 72-73° and decomposition took place very readily. For analysis it was dried at 50° for five hours when a brownish color had begun to develop.

I. 0.5668 Gm. lost 0.060 Gm. and gave 0.2016 Gm. Na_2SO_4.
II. 0.7395 Gm. lost 0.0814 Gm. and gave 0.2635 Gm. Na_2SO_4.
III. 0.6549 Gm. lost 0.0626 Gm.

Loss on drying: I. 9.57 p. c.
II. 9.92 p. c.
III. 9.56 p. c.

Sodium I. 11.51 p. c. on dried basis 12.75 p. c. calc. 13.36 p. c.
II. 11.54 p. c. on dried basis 12.79 p. c.

These results correspond to the formula $C_{10}H_{13}ONa$ as the composition of the compound obtained from ether.

Thymol reacts with sodium in ether in a lively manner but nothing could be crystallized out. Metallic sodium remained bright in the solution which was clear and almost colorless. It began to oxidize on long standing.

Carvacrol is completely extracted from alkaline solution by repeatedly shaking with ether. The ether was evaporated on the waterbath and in this way water was retained by the carvacrol. This material was obtained by working up a Monarda oil with 5 per cent. sodium hydroxide. To ascertain the amount of sodium in the carvacrol, presumably extracted as carvacrolate, a quantity of the clear phenol was evaporated and the residue ignited in a

crucible at a just perceptible red heat. The carvacrol carried only about 0.01 per cent. of non-volatile material.

I. 8.775 Gms. carvacrol gave 0.0007 Gm. non-volatile residue.
II. 8.675 Gms. carvacrol gave 0.0010 Gm. non-volatile residue.

Non-volatile residue.	Percentage.
I	0.009
II	0.012

It thus becomes apparent that from a solution of carvacrol in five per cent. sodium hydroxide the free phenol alone is extracted by ether.

In continuation of this work the behavior of various other solvents toward thymol in alkaline solution was determined on a somewhat more exact basis under conditions which would resemble those actually employed in the extraction of thymol from oils used as a source of the phenol. The use of 5 per cent. sodium hydroxide has been recommended for the assay of phenol-containing oils and also for extraction in preparation of the phenols and for analytical separations.

An alkaline solution was prepared from sodium hydroxide made by hydrating the metal to keep the product free from carbonate. Sodium was placed in a nickel dish covered with a layer of paraffin oil about 5 cm. deep in a casserole and a funnel just fitting into the casserole but over the dish covered the whole. A dropping funnel allowed water to run slowly on the metal. This solution was made up to 5 per cent. strength and standardized. When, however, the alkaline solution of thymol was prepared by adding one equivalent of the phenol, expansion took place almost equivalent to 1 Cc. per Cm. of thymol.

Vol. of alkali solution	840 Cc.	.....
Equivalent of thymol	.....	157 Gms.
Vol. of solution after	985 Cc.	.....
Increase	.....	145 Cc.

All of the thymol did not go into solution, however, and after continued shaking it was filtered and the residue recovered. The hydrolysis of the thymol sodium compound at these dilutions would effect also the amount taken into solution, as thymol itself is extremely slightly soluble in water. In view of this fact and because of the ease with which it is removed by ether a quantitative estima-

tion of thymol was made by weighing the thymol recovered after acidification and extraction with ether and evaporation of the solvent. In the further operations of extraction the thymol recovered was weighed after the solvent had been distilled off and thymol crystallized and allowed to stand in a vacuum desiccator until the weight became constant.

The accuracy of this method was investigated. One gramme of thymol was dissolved in 50 Cc. of anhydrous ether and distilled from a weighing flask in a hot water bath as long as ether came over. Then it was transferred to a vacuum desiccator over calcium chloride. The difference in weight was attributed to volatility of thymol with the vapor of the solvent under the conditions of the experiment.

A series of weighings on two samples carried out over sixteen days showed the following losses toward the end of the experiment:

	Sample 1,000 g.			
	I. Gms.	Loss per day. Gms.	II. Gms.	Loss per day. Gms.
Weighed	30.6863	.....	27.5524	.....
Feb. 4	30.83+	.....	27.68	.....
Feb. 6	30.7066	.....	27.5652	.....
Feb. 14	30.6946	.....	27.5524	.....
Feb. 18	30.6692	0.0062	27.5266	0.0064
Feb. 19	30.6660	0.0032	27.5256	0.0010
Feb. 20	30.6676	gain	27.5253	0.0003
Total recovery	97.97 p. c.		97.33 p. c.	

The ether distillate was tested for thymol by Flueckiger's test and 10 Cc. gave a positive reaction but the chloroform layer retained no pink of violet color indicating only slight quantities of thymol.

In this series it was noticed that the thymol remained fluid during the entire 16 days and only solidified after inoculation. Another series was run starting with moist ether that was standing over a layer of water in order to duplicate more closely the conditions of extraction of solutions where the ether is recovered in the moist condition. One gramme of thymol was dissolved in 50 Cc. and the ether distilled off and weighings made. After standing over night in the open air, the residue was seeded and weighings continued.

	Sample 1,000 g.			
	I. Gms.	Loss per day. Gms.	II. Gms.	Loss per day. Gms.
Weighed	30.6863	.....	27.5523	.....
Feb. 21	30.6844	.....	27.5506	.....
Feb. 22	30.6820	0.0024	27.5488	0.0018
Feb. 24	30.6750	0.0035	27.5423	0.0032
Recovery.....	99.57 p. c.		99.65 p. c.	

When the loss decreased per day to about 0.002 Gm. weighings were discontinued as the loss then became regular indicating sublimation of thymol as the single factor.

When the thymol recovered with dry ether is inoculated or otherwise induced to crystallize the normal rate of loss is established very much more quickly and recoveries of 99.09 and 98.47 per cent. were obtained.

This tendency of thymol to remain fluid was not alone characteristic of the solvent, ether, because as soon as the beneficial effects of crystallization were established all samples were inoculated. The heat of fusion was also efficient in removing the last traces of solvent and unless solidifying spontaneously, thymol was only inoculated after two days.

One characteristic of thymol is, however, its avidity for ether because fresh crystals of thymol exposed along with the evaporated ether solution in the desiccator took up enough ether to liquefy themselves. The other solvents were exposed in a similar manner but none caused this "deliquescence" of thymol. There is every reason to assume also that this supercooled thymol has a higher vapor tension and a corresponding higher rate of loss than the solid.

For extraction of the alkaline solution 50 Cc. were shaken with 50 Cc. solvent and this repeated twice with fresh portions of solvent. The cylinder containing the two was shaken vigorously for one minute and allowed to stand for three minutes to clear and shaken again one minute allowing two minutes for clearing and finally shaken again for one minute. These conditions were observed throughout the work.

The solution was emulsified as well as possible and transferred to a separatory funnel and the solution run off; the solvent poured off, and the funnel washed down with the solution, and allowed to drain. About two Cc.'s of solvent were used to wash the funnel

and added to the solvent. There was a slight loss of solution in these manipulations but the diminution in volume with loss of thymol from the solution and the amount taken up by the solvent always exceeded this quantity.

		Ether.		Heptane.	
		A. Cc.	B. Cc.	A. Cc.	B. Cc.
1st Extn.	Vol. of aqueous soln	50.0	50.0	50.0	50.0
	Vol. of aqueous layer	44.7	45.0	49.3	49.1
2d Extn.	Vol. of aqueous soln	44.0	44.7	49.0	48.9
	Vol. of aqueous layer	42.7	43.0	48.5	48.4
3d Extn.	Vol. of aqueous soln	42.0	42.6	48.3	48.4
	Vol. of aqueous layer	41.2	41.5	47.7	47.6

The various solvents employed were purified in approved manners. The ether was washed with dilute alkali; dried over calcium chloride and, after standing over sodium, distilled in a dry apparatus. The heptane was a very pure sample previously purified by hydrogen-bromide and had stood over sodium several months. It was used without distillation and probably boiled originally within one degree. The benzene was dried over sodium and distilled. The carbon tetrachloride and disulphide both were washed with dilute alkali and dried by standing over calcium chloride about a week. These commercial products were finally distilled to complete purification.

The amount of thymol as determined by acidification and extraction with ether and weighing after recovery of ether was 7.459 Gms. in 50 Cc. of solution. The concentration of alkali was 4.188 per cent. According to Seidell [10] thymol is soluble in water at 22° to the extent of 0.0936 Gm. per 100 Cc. and at 25° of 0.0981 Gm.; while in dilute hydrochloric acid such as resulted above the solubility is less. Extraction with ether would remove that also. As a rough check on the results of extraction except in the case of ether, the remaining alkaline solution was acidified and the thymol weighed after drying in the air over night, or until it became fairly constant.

[10] Seidell, A. C. J., 48 (1912), p. 453.

Solvent.	1st Extraction		2nd Extraction.		3rd Extraction		Total Extraction	Decrease in Volume.			Percentage of total remaining in solution extracted each time.		
	Wt.	Per cent.	Wt.	Per cent.	Wt.	Per cent.	Per cent.	1st. Cc.	2nd. Cc.	3rd. Cc.	1st.	2nd.	3rd.
Ether A	6.043	81.02	1.170	15.68	0.219	2.93	99.89	5.3	1.3	0.8	81.0	82.6	88.9
B	6.031	80.86	1.196	16.03	0.223	2.98	99.63	5.0	1.7	1.1	80.9	83.8	95.9
A	6.093	81.79	1.098	14.72	0.167	2.28	98.69	5.6	1.6	1.0	81.8	80.8	66.7
B	6.172	82.75	1.136	15.23	0.184	2.47	100.45	5.4	1.4	1.2	82.3	90.3	122.4
Heptane A	1.193	14.80	0.603	8.09	0.521	6.99	29.86	0.7	0.5	0.6	14.8	9.5	9.1
B	1.041	13.95	0.673	9.03	0.522	7.00	29.98	0.9	0.5	0.8	14.0	10.5	9.1
Benzene A	2.736	36.68	1.346	18.04	1.007	13.49	68.21	3.0	1.4	1.2	36.7	28.5	29.8
B	2.700	36.20	1.336	17.91	1.001	13.41	67.53	2.8	1.8	1.3	36.2	28.1	29.2
Carbon Tetra-Chloride A	2.285	30.57	0.962	12.90	0.687	9.21	52.74	2.3	0.9	0.9	30.6	18.6	16.3
B	2.263	30.34	0.970	13.00	0.683	9.16	52.50	1.8	1.2	0.4	30.3	18.7	16.2
Carbon Disulphide A	2.550	34.18	1.493	20.02	0.956	12.81	67.02	2.6	1.1	0.1	34.2	30.4	28.0
B	2.548	34.17	1.408	18.87	0.922	12.36	65.39	2.2	0.2	0.3	34.2	28.7	26.3

The results with ether bear out the conclusions of previous workers. Thymol is completely and somewhat readily removed from a dilute alkali solution with ether and after three extractions with about equal volumes of ether, practically no thymol remains in solution. Apparently in every case it was recovered as the free phenol and readily obtained crystalline. Heptane is the most indifferent solvent chemically and extracts the least amount of thymol. This is in accord with the observations previously made that it exhibits a striking selective solvent action in many cases. It would be very valuable in purifying an alkaline solution obtained in extracting thymol from an oil. Thymol recovered by the use of carbon disulphide seemed to be the brightest and of the most pleasing appearance. There is some color developed in the alkali and carbon disulphide reacts with the dilute alkali because hydrogen sulphide is given off on acidification for recovery of thymol. However, benzene is about equally effective as a solvent.

The increasing concentration of alkali with diminution of thymol content does not seem to effect ether, and benzene and carbon disulphide respond slowly, but heptane and carbon tetrachloride are effected very considerably. This fact is also of interest in the assay of phenol-containing oils by means of dilute alkali where heptane is used to prevent the formation of emulsions and permit easier and quicker readings of the volume remaining unabsorbed.

SPIDERS USED IN MEDICINE.

By J. T. Lloyd, Ph.D.

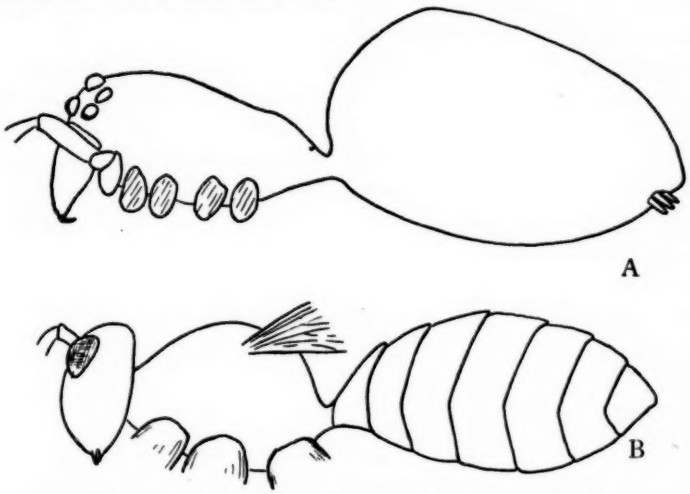
CINCINNATI, OHIO.

That insects and their by-products, such as shellac and honey, play an important part in the economy of man, is known to all. Perhaps, however, it is better known to the physician than to the layman, that a few spiders play their role in the practice of medicine. These spider remedies, like the insect medicines, are not of modern origin. In old works one finds frequent references to cobweb, which was then administered in the form of pills instead of the modern alcoholic pharmaceutical preparation, Tela Araneæ.

In the popular mind there is often little knowledge of the distinctions between spiders and insects, although the class *Arachnida*

(to which the spiders, but not the insects, belong) contains several orders, such as the scorpions, that are closer akin to the spiders than are the insects. Most of these are so distinct in superficial appearance that there is little probability of their being mistaken for spiders.

If one will remember that spiders have four pairs of legs, apparently no antennæ, and that their head is not separated from the thorax by a neck-like constriction, there need be no trouble to distinguish them from insects; which have three pairs of articulated legs, one pair of antennæ, and head and thorax separated by a distinct "neck." In the class Arachnida, spiders may be easily separated from other orders by remembering that thorax and abdomen are separated by a short, slender stalk, and the abdomen is not segmented. In their nearest relatives, the mites, the thorax and abdomen are fused and sack-like.



(A) **Diagram of a Spider.** The head and thorax are fused, the abdomen is not segmented; there are four pairs of legs; there are no antennae, but a pair of leg-like pedipalps arises in front of the first pair of true legs.

(B) **Diagram of an Insect.** The head and thorax are separated by a "neck"; the abdomen is segmented; there are but three pairs of legs; a pair of true antennae arises from the head in the region of the eyes.

Since very early times many people have looked upon spiders with unfounded dread and superstition. During the medieval

period, "Tarantism," a contagious disease that was common in southern Europe, especially Italy, was believed to have been started by the bite of a spider. The victims of this disease were possessed with an uncontrollable desire to dance. In our own day and among our own people it is not unusual to blame the bite of a spider for swellings or itchings of unknown origin, but when questioned the sufferer is invariably unable to give other evidence that a spider is responsible for the trouble, than the usual answer, "What else could have done it?" On this negative evidence the blame is fixed for about one hundred per cent. of the "spider bites" of our people.

With the possible exception of a single species * in our Southern States, and the true tarantulas of the Southwest, it seems safe to accept that there are no spiders in our country whose bite need be in any way feared. The writer has handled large numbers of our native spiders, as well as (during excursions in the tropics) hundreds of the "banana tarantulas," which are not true tarantulas, but harmless spiders of a different family. True tarantulas may sometimes, however, be found in banana bunches. In no case has the writer been bitten, and frequent attempts to induce spiders to bite the tender skin between his fingers resulted in failure. Others who have made this experiment with success report that the wound inflicted is no more painful than a slight prick with a needle. That spiders do inject a virus into their victims is indisputable, but it is in quantities sufficent only to paralyze an insect. Besides, it is injected so slowly that little, if any, could be secreted during the short interval that the "jaws" remain in the wound of an animal as large as man.

Spider Web.—All species of spiders are capable of spinning web, though far from all spin orbs or sheet-like webs for entrapping prey. Many species only throw out a "drag line" as they move from place to place, or drop from surface to surface, and never spin a more complex web, except in wrapping their egg masses.

The web material, or silk, is produced in large glands within the spider's abdominal cavity. In the glands the material is liquid or mucilaginous, but (except certain parts of the viscid silk) immediately hardens on exposure to the air. From the glands it passes

* Latrodectus mactans, a jet-black spider with markings of yellow or red.

to the exterior through silk ducts, which often open on movable, finger-shaped "spinneretts."

In all, spiders produce seven distinct kinds of silk; some thread-like, some band-like, some viscid, some dry. Though most spiders secrete more than one kind of silk, and some spiders secrete several kinds, no one spider secretes all seven. Each kind of silk originates in its own distinct glands and passes to the exterior through its own opening.*

For pharmaceutical preparations an attempt is made to collect the sheet-like webs of *Coras medicinalis* (*Tegenaria medicinalis*) from the corners of rooms in warehouses and kindred places. It is probable, however, that the webs of the several species of dwelling-inhabiting spiders enter into all pharmaceutical preparations of web. No collector of webs could be expected to possess technical knowledge sufficient to enable him to distinguish species. If he should possess the required knowledge, it would be impracticable for him to take the time to apply his training for the examination of each web collected. Nor is there need for such discrimination. No reason why the web of one species of dwelling-inhabiting spider should be of different therapeutical qualities from another, has ever been recorded.

We do not know that a chemical analysis of spider web has ever been made. Tests given pharmaceutical preparations, however, show an absence of sugar, but give a slight reaction to Mayer's test for alkaloid. This is true also of tincture we have prepared from fresh web. The therapeutic value of the preparation may be in part due to this alkaloid.

In the present-day practice of medicine the large spiders of the sub-family *Aviculariinae*, commonly known as "tarantulas," or "bird spiders," are employed by Homœopathic physicians. Under the name of *Mygale lasidora* the Pharmacopœia of the American Institute of Homœopathy, 1897, page 408, gives directions for preparing the tincture of the "whole spider." Other references to the preparation and use of Mygale (tarantula) are given in Allen's "Encyclopedia of Pure Materia Medica," Vol. VI, 1877, and elsewhere.

* A careful and interesting account, written in non-technical language, of the habits, anatomy and classification of spiders, may be found in *The Spider Book*, by John Henry Comstock. Doubleday, Page & Co., 1912.

Spider and Spider Web in Medicine.—At least since the time of Pliny (first century A. D.) literature on medicine abounds in references to the use of spiders and their webs. The ideas of most of the old authors concerning the medicinal use of spiders, as may be noted in the following quotations, seem little more than "charm medicine" or superstition. Let us quote:

Spiders. "The fly-catching spider, wrapt in a linen cloth and hanged on the left arm, is good to drive away a Quotidian, saith *Trallianus* (sixth century, A. D.). But better if any of them be boiled with oil of bay to the consistence of a liniment; if you anoint the arteries of the wrists, the arms and temples before the fit, the fever abates and seldom comes again. *Koronides or Koranus.** A spider bruised with a plaister and spread on a cloth and applied to the temples, cures a tertian. *Dioscorides* (first or second century, A. D.). The spider called Lycos, put in a quill, and hanged on the breast doth the same. *Pliny* (first century, A. D.). That house spider that spins a thick fine and white web, shut up in a piece of leather or a nut-shell, and hanged to the arm or neck, is thought to drive away the fits of a quartane. *Dioscorides* saith he proved it to be true. Three living spiders put into oil, let them presently boil on the fire, drop some of that oil warm into the ear that is in pain, and it profits much. Or press out the juice of spiders with juice of roses, and put it in with wool. *Marcellus Empiricus* (380-408, A. D., or later). Pliny bids infuse them in vinegar or oil of roses and stamp them and then drop some into the ear with saffron, and it will still the pain certainly: Discorides affirms as much. *Sofratus* . . . saith, that Cranacolapsus (a certain spider) drowned in oil, is a present remedy against poisons, as the Scholiast of Nicander (second century, B. C.) professeth. Aetius (about 500, A. D.) for suffocation of the mothers, applied a cerate of spider to the navel, and said it did great good."

. . . . . .

Spider Web. "The spider's web is put into the unguent against Tetters, and applied to the swellings of the fundament, it consumes them without pain. *Marcellus Empiricus.* Pliny saith it cures runnings of the eyes, and laid on with oil, it heals up wounds in the joints. Some rather use the ashes of the webs with Polenia and wine. Our chirurgians (surgeons) cure warts thus: They wrap a spider's ordinary web into the fashion of a ball, and laying it on the wart, they set it on fire, and so let it burn to ashes, by this means the wart is rooted out by the roots, and will never grow again. Marcellus Empiricus was wont to use the web of spiders found in the Cypress tree in a remedy for the Gout to ease the pains."—*Mouffet, "The Theater of Insects,"* 1858, page 1023.

A few of the early writers, like Antoninus Pius, and more during the medieval period, used the web to stop the flow of blood.

* King of Persia, who wrote a work on natural history.

For this purpose it was also used by the American Indians, as well as in domestic practice, no doubt with a real value. For example:

"Antoninus Pius (86-161, A. D.) was wont to say, that the quirks of sophistry were like to Spiders' Webs, that had a great deal of art and ingenuity in them, but very little profit. But how often hath the blood run forth from the body most miserably by a fresh wound? Yet it had been easy to have stopped it by laying on a spider's web."—Mouffet, *"The Theater of Insects."*

"Telia Aranearum, Cobweb.—Every one knows what this is, and how produced. It appears not in medicinal prescriptions, but as accident, for want of other helps, has taught its use to common people for stopping blood in a fresh wound. And this it seems to do by its extraordinary fineness; which makes it adhere to, and top up the mouths of the vessels, so as to prevent the effusion of their costents."—*Quincy's Compleat English Dispensatory,* 1749.

"Aranearum Telae Pharm. Edinb., Cobwebs. These are applied by the common people for stopping the bleeding of wounds; which the effect, not by any styptic power, but by adhering to the part, and closing the orifices of the vessels."—*Lewis' Materia Medica,* London, 1768.

"The web astringes and conglutinates, and is, therefore, vulnerary; restrains bleedings, and prevents inflammation. The country people have a tradition, that a small quantity of spider's web, given about an hour before the fit of an ague, and repeated immediately before it, is effectual in curing troublesome, and sometimes obstinate distemper. This remedy is not confined to our own country, for I am well informed that the *Indians* about *North Carolina* have great dependence on this remedy for agues, to which they are much subject; and I am acquainted with a gentleman long resident in those parts, who assures me he was himself cured by it of that distemper. And, indeed, experience confirms the efficacy of this medicine in the cure of agues."—James, *New English Dispensatory,* London, 1747.

In May, 1809, The Medical and Physical Journal of London published a long article by Dr. Robert Jackson, calling to the attention of the profession the medicinal use of spider web, or cobweb, in the treatment of intermitting fevers. Frequent references have been made to this article by subsequent publications in Europe and in America. After Dr. Jackson's publication, the use of spider web in the treatment of malarial fevers seems to have been neglected until about 1865, when articles by Dr. L. M. Jones appeared in "The Lancet and Observer," Cincinnati, and in Jones and Scudder's Materia Medica. These again brought it to the attention of physicians:

"Inasthma it is said to allay irritation, tranquillize the system, and act like a charm. In spasmodic complaints of females; in chronic hysteria, and other diseases attended with morbid irritability of the nervous system, it has been advantageously employed. Dr. Webster, of Boston, has found it beneficial in rheumatic affections of the head, asthma, and chronic coughs. He says it produces a pleasant delirium and exhilarating effects resembling the nitrous oxide gas. Dr. Gillespie used it in obstinate intermittents successfully, after other remedies had proved ineffectual. He thinks it more effectual than bark, arsenic, or any other remedy he has employed.

Dose.—Gr. v to vj, in pill; repeat every three or four hours. Dr. Jackson thinks a dose of gr. v produces nearly the same effects as one of gr. xx." —*Jones and Scudder's Materia Medica.*

After the articles by Dr. Jones the use of web gained constantly in the favor of many physicians. Present-day literature contains numerous testimonials to its use in the treatment of intermittent fever, and in diseases of sudden appearance, when there is a tendency to congestion, with cool clammy skin, cool extremities, and cold perspiration.

Among the patients of the late Dr. L. A. Perce, of Long Beach, California, were many tourists afflicted with malaria. Some of these had been to use his words, "dosed with quinine until it had lost its effect." For such patients he states that he employed tincture of "Tela Araneæ," with gratifying results.

Until comparatively recently, as already stated, the web was administered in the form of pills, instead of in the alcoholic pharmaceutical preparation, "Tela Araneæ," of the present day.

PERU BALSAM AND ITS ADULTERATION.*

By L. Van Itallie.

A sample of Peru Balsam was obtained for investigation. The sender had found that it fulfilled the criteria, which I had formulated before (*Pharm. Weekbl.* 1919, p. 1199), but that it did not possess the proper odor.

I found the same thing, and further that the balsam had a consistency of a thin syrup; whereas, it ought to be thicker, to fulfill the qualitative tests. The balsam showed further, the spec.

*From *Pharmaceutisch Weekblad,* Nov. 6, 1920.
Translated by Dr. D. H. Brauns, Washington, D. C.

grav. (1.146); acid number 48.8; saponification number 356, cinnamein content 70 per cent. and saponification number for the separated cinnamein 382. The saponification number of the balsam as well as the saponification number of the cinnamein are too high. For normal balsams they are not higher than 260. The acid number is too low. Hence an adulteration with an ester was probable. On account of the high saponification numbers, adulteration with the methyl ester of benzoic acid or with an ester of a di-basic acid was expected. In order to determine this matter to a certainty the aromatic ester was separated from a larger sample of the balsam.

By saponifying a part of this ester with alcoholic potash (½ normal) needles were obtained, which were collected and dissolved easily in water. The solution was acidified and separated on standing a crystalline powder, which when heated with resorcinol and sulphuric acid could be converted into fluorescein. The powder was therefore phtalic acid. Fractional distillation showed that the aromatic esters distilled for the larger part at 282°-286°. It is therefore probable that most of it consisted of the dimethylester of phtalic acid, which has often been reported as an adulterant for cinnamein and esential oils. The adulteration is so obvious, that quantitative tests are not even necessary for its identification.

If one drop of the balsam is heated to boiling with 100 milligrams resorcinol and 10 drops of sulphuric acid, fluorescein is formed which is easily detected on addition of alkali. As charring occurs it is recommended to dilute the heated liquid with water before adding the sodium hydroxide solution. The fluorescence is obtained in this way between the layers.

Pure balsam treated in this way only shows a weak fluorescein reaction.

The adulterated balsam, which as I afterwards was informed is put on the market as *Balsamum peruvianum syntheticum,* may also be recognized by the test published by Dietrich (*Ber. d. Deutsch. pharm. Gesell.* 1908, p. 142), as follows: 500 mgm. to 1 gm. balsam are dissolved in ether and shaken with 2 per cent. NaOH. By adding acid to the alkaline solution the resins are separated. These resins are dissolved in ether and carefully poured on sulphuric acid. Genuine peru balsams will never show a green or blue layer, not even

after adding hydrochloric acid to the ether-sulphuric acid layers. The adulterated balsam showed a blue colored layer.

One of our pharmaceutical firms supplied me with benzoyl-benzoate, which according to the statement of the firm, was used for the preparation of substitutes for peru balsam. It is obvious that if benzoyl-benzoate is used for adulteration a normal number for the saponification number of the cinnamein is found on analysis as benzoyl-benzoate is one of the principle constituents of cinnamein. However, I found that the received benzoyl-benzoate and also a preparation of one of the laboratories of our university showed a strong fluorescein reaction with resorcinol and sulphuric acid, probably because the preparations were made with benzoic acid, prepared from phtalic acid. Anyhow, an adulteration may be detected by this test.

Another product, appearing on the market as *Balsamum peruvianum syntheticum* (the manufacturers seem to have a peculiar notion of the word synthesis) gave on analysis by my assistant Miss M. le Coultre, the following results:

Acid number	48.1
Saponification number	220.4
Cinnamein in %	64.0%
Saponification number of the cinnamein	254
Refractive index of the cinnamein	1.5682

From a mixture of 3 vol. of this balsam and 1 vol. carbon-disulphide a kind of jelly separated out.

Five drops of balsam shaken with 8 cc. petroleum ether separated a powder, and some of the balsam stuck to the walls of the tube.

The fluorescein reaction was stronger than with the unadulterated balsam. Dietrich's test gave a pretty green ring reaction which became greenish blue on addition of hydrochloric acid.

Notwithstanding the normal figures obtained with the quantitative analysis, this preparation was recognized by the qualitative tests as an artificial product. It was made undoubtedly with benzoyl-benzoate.

I was told that genuine peru balsam did not find buyers; whereas, the so-called synthetic preparations were easily sold. I hope that the Dutch apothecaries will keep their high standing by not buying these preparations.

AN EPOCH MAKING DISCOVERY.

By Charles H. LaWall, Ph.M.,
PHILADELPHIA, PA.

It is bromidic to quote the oft repeated proverb about the prophet and his own country, and yet none other is applicable to the situation in which Einstein finds himself in Germany while much of the remaining scientific world is doing him homage and discussing his work on "The Special and General Theory of Relativity."

This is an age of pragmatism and while the educational attainments of the average individual are higher than ever before in the world's history, it is to be doubted whether there is much sympathy with, or consideration of, abstract principles as a rule, except among mathematicians and physicists.

From the earliest times there have been those who went out of their way to grapple with the unknown, whether or not the rewards were apparent. Babylonian arithmeticians and Egyptian geometers had exercised their mathematical abilities chiefly along the lines of mensuration, with some attention to astronomy, but when the speculators of Hellenic Origin appeared, abstract mathematics became a cult which lasted for several centuries and which influenced human thought for all time. Thales, Pythagoras, Plato, Euclid, Aristotle and Ptolemy, were little concerned with the practical applications of their theories, yet they paved the way for Copernicus, Descartes, Galileo and Newton, who came many centuries later.

The pupil of Euclid who asked "What do I get for learning these things?" typified a state of mind common to all ages, and probably approaching its highest peak in our own time, as indicated by the general apathy with regard to the underpaid members of the teaching profession, and the attitude of the average school pupil or college student who aims not at perfection in his work but sets his goal at the minimum passing grade.

In Francis Bacon's classification of human knowledge (1630) speculative Philosophy occupied a larger proportion of the diagrammatic scheme than would be accorded it by one who attempted a similar outline today, and yet the worker in pure research, or the one who discovers and records an abstract scientific principle, may be conferring upon future generations blessings incalculable.

The continuity of scientific effort in any single direction is more evident in our era than at any previous time in the world's history.

More than two thousand years elapsed between the crude steam appliances of Ctesibus and Hero, and the steam engine of James Watt, and outside of one experiment of Leonardo de Vinci, most of the developmental work occurred in the century in which Watt himself lived.

It took comparatively few years for the discovery of the Hertzian waves to find their practical application by Marconi, and yet Hertz and his co-workers never dreamed of such a thing as wireless telegraphy, nor profited by their work except in reputation.

The work of Albert Einstein, which deals particularly with space and time, and which concerns itself in reality with a method of interpretation of old rather than the promulgation of new principles, is looked upon as epoch-making in its possibilities by some of the mathematicians, physicists and philosophers, who are in close enough touch with the subject to be able to judge thereof intelligently.

For the individual not actively engaged in the fields of work most directly affected by Einstein's observations, articles have appeared; lectures have been delivered and books have been written for the purpose of stopping down the high voltage of the original communication to a lower potential which will not burn out the mental coils and fuses of the average intellect. Dr. Leffmann has humorously and approximately correctly translated the Einstein idea into the epigrammatic form that: "You cannot tell where you are unless you know what time it is and you cannot tell what time it is unless you know where you are."

In Euclidean geometry, as taught in our elementary schools, descriptions of events in space presuppose the existence of a rigid or invariable body to which such events may be referred.

No cognizance is taken of differences of values in observation due to the fact that one observer is in motion while the other is at rest, nor of differences in interpretation due to time discrepancies.

In physical science data have long been accumulating for which no use could be found in the calculations of three dimensional or ordinary space. By the introduction of the time factor a four dimensional space-time combination becomes possible and these hitherto unused data are said to find a place.

In the Einstein method of interpreting mathematical and physical data the length of a measuring unit or the duration of an event

are not absolute quantities, as has always been hitherto assumed in physics, but it is declared that they actually have different values for different systems of reference moving with relation to one another.

Newton had established concepts of what it has been customary to call "Absolute true and mathematical time" and "absolute space."

Experiments of certain physicists had proved man's inability to detect absolute motion (motion with respect to the hypothetical æther). This has recently led to the development of a theorem to the effect that "all laws of physical nature should have been formulated with reference to a definite coördinate system, are valid, in precisely the same form when referred to another coördinate system which is in uniform rectilinear motion with respect to the first."

This empirical law is Einstein's "Special Theory of Relativity."

It is a simple matter to make time duration calculations with a clock situated where the event is taking place. It is more difficult to make such calculations with events happening at two different places, for then some elaborate precautions must be taken to bring the two clocks into synchronous agreement. When we come to deal with calculations where the clocks are not at rest with reference to each other, as for instance, when one is on a railway train traveling at a high rate of speed, all ordinary methods of measurement and comparison fail.

Such refinements of observation seem to be beyond our conceptions of practicality and yet we are assured of their value by those who deal with calculations involving the physical laws, particularly with reference to light.

One of the modern concepts, which is at variance with Newtonian principles, is the declaration that a gravitational field has an influence upon a ray of light. Einstein asserted his ability to prove this by the application of his method to observations and calculations of certain astronomical phenomena. This assertion is said to have been confirmed by observations of the photographic registrations of stars during the eclipse of the sun in May, 1919, and afford justification for the hope that some of the obscure laws of nature may be fathomed by a further pursuit of this subject by those

philosophers who are equipped for this recondite branch of human study.

In the words of one of the recent interpreters of Einstein to the multitude this thought is expressed as follows: "The main philosophic achievement of the special theory of relativity is probably the recognition that the description of the event, which is admittedly only perfect, if both the space and time coördinates are specified, will vary according to the relative motion of the observer; that it is impossible to say, for instance, whether the interval separating two events is so many centimeters and so many seconds, but that this interval may be split up into length and time in different ways, which depend upon the observer who is describing it." *

The "general theory of relativity" concerns itself with the broader fields of human speculation and endeavor. This is much more daring and less easily comprehended without a knowledge of higher mathematics and there are those among the physicists and mathematicians who characterize it as "Metaphysical Mathematics" and "Intellectual Moonshine."

The fundamental question, "are space and time real?" cannot be answered simply and categorically. Space and time for human comprehension and appreciation are dependent upon the existence of things which lie closer to our senses.

If there were no material bodies we could have no conception of "space" and if no events or changes took place "time" would be devoid of meaning. The world-old question as to what constitutes reality finds the answer of the modern physicist eminently satisfying. "Whatever can be measured is real."

Are space and time real? Both being measurable we unhesitatingly reply in the affirmative. Yet if we perform the imaginary experiment of the celebrated French mathematician Poincaré and "suppose that all material bodies should increase over night one hundred fold," we should be unable to perceive the change, for all of our measurement standards and units would have changed likewise. We should still call an inch by that name although it had increased to more than eight feet. How can we argue convincingly about the reality of space, therefore, except as a relative concept.

So in the same way our time determinations become as closely associated with physical bodies as our ideas of space, and quantita-

* "Space and Time in Contemporary Physics," by Moritz Schlick.

tive determinations are predicated upon some prearranged method of synchronizing our clocks; otherwise conceptions of simultaneity and equal duration can have no definite and invariable meaning.

The influence of the gravitational field prevents the application of the special theory of relativity to any but systems at rest or moving uniformly and rectilinearly.

The mathematical development of the theory presupposes the introduction of the time factor as a fourth coördinate and calling the new and complex curve thus produced the *World-line* of a given point. The final formulation of the Einstein Law is expressed as follows: "The world-line of a material point is a geodetic line in the space .time continuum." The time factor is not introduced simply as such, but as $ct = x_4$ in which c denotes the velocity of light.

The statement that every motion is relative may be looked upon as another way of expressing the view that space and time have no physical objectivity. Space and time are not measurable in the abstract. They constitute the framework which we fill up with physical events, both spatial and chronological.

We gain our knowledge of both space and time by direct experience, so in our everyday life we shall continue to deal with them as heretofore. To the physicist and astronomer, however, new fields of research are already opening and it is not too much to expect the future to bring us into closer harmony and a more nearly correct understanding of electrodynamics and gravitational law with a realization, perhaps, that matter after all is but one of the manifestations of energy.

One comfort for the average student of mathematics is found in the assertion that "Euclidean geometry is to remain valid for infinitely small portions" which includes those within the ken of our ordinary daily life. The trouble with the whole subject at present lies in the fact that Einstein enthusiasts are presuming to "prove the unprovable" and to make assertions to the effect that there is such a thing as "finite space without boundaries."

Students of philosophy who remember the speculations of Kant in his "Subjectivity of Time and Space" and Locke in his "Essay on Human Understanding," and Leibnitz, the originator of differential calculus, will enjoy the spiritual exhilaration of cleaning out the cobwebs of the mental attic, by reading one of the works which have recently been published in which the subject is discussed with a

minimum of complex mathematical details, although it will be realized that workers in Physics are rapidly ascending to heights in which the rarefaction of the mental atmosphere will soon make it impossible for the person of ordinary education to accompany them, and in which they will be invisible to those below the cloud strata of higher mathematical formulas.

A HIGHER DEGREE IN PHARMACY.

By James F. Couch.

Pharmacy has never been more in need of research work upon strictly pharmaceutical problems than it is at the present time. The great stimulus to investigation which was the joint effect of the altered economic conditions caused by the civil war and the direct efforts of the American Pharmaceutical Association and which developed Squibb, Maisch, Lloyd, Hallberg, Remington, Diehl and others reached its peak in 1885 and has been declining ever since. Today we have little beside pharmacological and phytochemical studies in pharmaceutical literature; the problems of pharmacy are left unattacked and unsolved.

What has become of the spirited discussions over the preservation of fluid extracts and tinctures which were wont to absorb the attention of the "scientific section" of bygone years? The problem is still with us for our galenicals still precipitate. Has the interest in this strictly pharmaceutical question disappeared since the corner druggist scrapped his percolator and began to purchase his galenicals from the manufacturing pharmacist?

What has become of the perennial attempts to compound a strong solution of Epsom salt with the taste so disguised that the objection to this valuable medicament might be largely overcome? The solution of this problem would be a boon to pharmacist, physician, and a long-suffering general public. The pecuniary reward to the discoverer, if he chose to market his preparation as a semi-proprietary, would be considerable. And this problem is not at all unsolvable. While it may not be quite as simple as the debittering of cascara it needs only determination and study to ensure success.

Many problems have been partially or fully solved by manufacturers. In most cases, however, the results of such investigations and the processes devised are withheld from publication and,

consequently, diffuse very slowly and imperfectly into the general knowledge. It is not my purpose here to attack the "trade secret" doctrine; there are many arguments which support it; the net effect of it is, as most will acknowledge, an impediment to pharmaceutical progress and actual loss to the secretive ones themselves.

For progress in the solution of our problems, then. we must look to two sources, the independent investigators and the colleges of pharmacy. Of the first class the numbers are small, so small that main reliance must be placed upon the second class, the colleges.

From these latter there has emanated a varying stream of investigations covering the whole field of pharmaceutical sciences. At times the number of reports published has been very large; at other times it has dwindled to quite inconsiderable volume. It needs a stimulus and the following paper offers a suggestion as to how this stimulus may be found and applied.

It is proposed that there be established the degree of Doctor of Philosophy in Pharmacy.

In other lines of scientific activity a large proportion of the research work accomplished is done at our colleges by students who are candidates for the Ph.D. degree. The research professor has a constant stream of students coming to him to be put to work on some of his problems. He may carry out investigations covering a long period of years and utilizing a number of students. The result of this system has been the accumulation of vast amounts of eminently practical knowledge and the dispelling of moss-covered and age-encrusted errors. The student acquires a mastery of his subject, a finished technique, and the very desirable degree without which certain avenues of scientific endeavor are all but closed to him.

Can this not be applied to pharmacy? Let us see. The standard requirements for the Ph.D. degree in American institutions of the first grade are; the bachelor's degree from a college of good standing; a knowledge of German and French; and three years' graduate work, including research, at least one year of which must be spent in residence at the university which grants the degree. The graduate work involves the accomplishment of a stated amount of work in one "major" and two "minor" subjects with the presentation and defense of a thesis which reports the results of original investigations conducted on problems in the "major" subject. Original work

in the "minor" subjects may also be presented but is not usually required.

In order to obtain adequate recognition for the Ph.D. in Pharmacy these standards must be rigidly adhered to. If the degree should be granted to candidates who could not fulfill these requirements the result would inevitably be a cheapening of it with consequent disrepute and the circumstance would react very unfavorably upon pharmacy.

As applied to the art of pharmacy the requirements should include a certain amount of "practical" experience and it is permissible that a small amount of credit be given for unusual or extensive qualifications of this sort. Credit may be given for research work conducted in and published from industrial laboratories and it is desirable that this be done. In this way the time required to obtain the degree may be somewhat shortened. As the major subject of the candidate, "pharmacy" should always be chosen; the minors may be selected from the long list of pharmaceutical sciences and one minor may also be "pharmacy."

In addition it would become possible for any college of pharmacy which grants the higher degree to confer it *honoris causa* upon eminent pharmacists whom it desires to honor. The possibility of being so honored would furnish an additional stimulus to independent investigators.

The effect on general pharmacy of the establishment of this degree must be widespread and must extend far beyond the stimulation of research and solution of problems. It will serve to draw a distinction between the man who studies pharmacy merely for the purpose of passing the State board examination and the real pharmacist who desires a profound knowledge of pharmacy and of the sciences germane to it. Eventually the faculties of our colleges will be composed of Ph.D. (Pharm.) men and the same type of men will be found in charge of the manufacturing, control and research laboratories of our pharmaceutical factories. A general rise in the whole tone of the art of pharmacy must follow for these men can demand and will receive the recognition accorded to first-rate technical experts. The military and naval services could no longer withhold commissions from pharmacists when the candidates possessed such qualifications.

The career open to a pharmacist of this grade would unquestionably attract young men of superior abilities and high aims who

now enter other fields which return greater rewards than does pharmacy. What a raising in standard would follow the influx of a proper proportion of the best of the intellectual youth in the country! Is it not well worth attracting?

All that need be done to start is this: let one of our prominent colleges of pharmacy announce that it will confer the Ph.D. (Pharm.) degree upon properly qualified candidates who comply with certain stated requirements. If necessary, the college may obtain from the State the right to confer the degree. At first the number of candidates will probably not be great but, as time goes on and when men observe that the holders of the degree are preferred for the better sort of pharmaceutical positions, the number of candidates will increase until the degree will come to be accepted as a prerequisite for a scientific or technical career in pharmacy.

HYENANCHIN AND OTHER CONSTITUENTS OF *HYENANCHE GLOBOSA.*

A paper on this subject was read by Dr. T. A. Henry, Director of the Wellcome Chemical Research Laboratories, at the meeting of the Chemical Society of London on December 2. This plant belongs to the natural order Euphorbiaceae and occurs in South Africa, where it is used for poisoning wild animals, especially hyenas, a use reflected in the generic name Hyenanche, and also in the common name of the plant, hyena-poison. It was examined in 1858 by Henkel and in 1892 by Engelhardt, and shown to contain a toxic substance, which the latter author isolated in crystalline form and called hyenanchin. It is now shown that the crude crystalline material isolated from the plant consists of two isomeric crystalline substances of the formula $C_{15}H_{18}O_7$; one of these is toxic and for this the name hyenanchin is retained, whilst the other, which is physiologically inactive, it is proposed to call *iso*hyenanchin. Pharmacological investigation of these two substances is still in progress by Dr. J. Trevan of the Wellcome Physiological Research Laboratories but sufficient has been done to show that hyenanchin has an action, weaker than, but identical in kind with that of picrotoxinin and so belongs to the group of non-nitrogenous, convulsant poisons. It is interesting in this connec-

tion to note that just as hyenanchin occurs along with the non-toxic isomeride, picrotoxinin is associated in *cocculus indicus* with the inactive substance picrotin. All four substances are dilactones and whilst picrotoxinin and its associate yield acetone on distillation with alkalis, hyenchanin and its isomeride yield hydroxyacetone.

The subsidiary components of Hyenanche include a new wax alcohol $C_{24}H_{49}OH$, a new phytosterol $C_{28}H_{46}O$ and a new yellow colouring matter $C_{15}H_{12}O_6$ belonging to the flavone series and showing some characteristics in common with morin.

THE TRADE-MARK ACT OF 1920.

By L. M. Mida

of

Mida's Trade-Mark Bureau,
Chicago.

Help in holding business already won and in gaining new patronage is given manufacturers and exporters by the trade-mark law of 1920.

Before the passage of this law, there were trade-marks in use which could not be registered under the Trade-Mark Act of February 20, 1905.

That is to say, although the validity of such trade-marks was acknowledged in common law, they did not meet the requirements of the United States Patent Office.

In many instances, such trade-marks earned their popularity at first in local circles of trade. They served to identify a product in the community where it was made and sold.

When devising these emblems, manufacturers had in mind some symbol which would not be hard to remember. Moreover, they sought to compose a token which would be different enough from other trade-marks to enable people easily to recognize the goods to which it was applied.

Not much thought was spent upon whether or not the trade-mark could obtain registration in the Patent Office at Washington, D. C.

There were numerous cases in which a time came when the

manufacturer achieved national distribution of his product under the local-trade-mark and began to plan for business in foreign markets.

Then he discovered that his trade-mark could not get official recognition abroad because some foreign countries require certificates of United States registration before granting similar rights under their laws.

The new Trade-Mark Act of 1920 removes this obstacle from scores of trade-marks which have hitherto been valid only in common law.

A notable example is that of "Kitchen Klenzer," which was refused registration under the law of 1905 because it is descriptive in character.

KITCHEN
KLENZER

The manufacturers of Kitchen Klenzer had spent a fortune in advertising that name. When they were refused registration for it under the law of 1905, they appealed to the Commissioner of Patents.

The latter could legally pursue only one course in the matter. He was obliged to confirm the Examiner of Trade-Marks in his decision that this mark was descriptive and, consequently, barred from registration under the provisions of the law.

The new Trade-Mark Act of 1920 permits registration of descriptive or geographical words and names of persons, firms, or corporations, without requiring that they be displayed in some peculiar or distinctive manner.

Certain reasonable restrictions, however, remain in effect, forbidding registration of trade-marks consisting of immoral or scandalous matter or comprising the flag or coat of arms or other insignia of the United States or any simulation thereof, or of any state or municipality or of any foreign nation, or of any design or picture which has been or may hereafter be adopted by any fraternal society as its emblem, or of any name, distinguishing mark, character, emblem, colors, flag, or banner adopted and publicly used by any institution, organization, club, or society which was incorporated in any State in the United States prior to the date of the adoption and use by the applicant.

Thus the Trade-Mark Act of 1920 does not exclude marks which are merely geographical, as for example the word "Cleveland," which has become widely known in connection with a line of tractors.

Cleveland

This trade-mark represents big values in the form of good will, resulting from persistent publicity and its logical accompaniment, good craftsmanship and uniform quality.

It was refused registration under the law of 1905, but has been granted Federal recognition under the more liberal provisions of the Trade-Mark Act of 1920.

Other marks, descriptive in character, were rejected under the old law for the reason that they consisted principally of a representation of the goods upon which they were used.

A case in point is that of a picture of a pair of children's garters, employed as a trade-mark for garters.

It is true that a measure of relief was granted by the Act of 1905 in its "ten-year" proviso, which permitted the registration of a common-law mark which had been in exclusive use by the applicant for ten years preceding February 20, 1905.

But it made no arrangement for the protection of common-law marks which were adopted at any time after February 20, 1905, or which might be adopted at any time in the future.

In the circumstances prevailing prior to the passage of the Trade-Mark Act of 1920, any of the common-law trade emblems—as, for example, "Kitchen Klenzer"—could be stolen outright by a citizen of another country and registered in that country as his exclusive property.

The American owner of the trade-mark could not prevent the theft because he could show no certificate of Federal registration to enable him to forestall such action by obtaining registration of the trade-mark in his own name in the foreign country.

Unless he took the time and trouble to devise a new trade-mark, wholly different from the stolen one, he would have to pay tribute to the citizen of another land for the right to import and sell his goods in that land under an established trade-mark which was his in the first instance.

In the hearings conducted by the House Committee on Patents,

prior to the enactment of the 1920 Trade-Mark law, Commissioner of Patents Newton drew attention to the ease with which well-known American trade-marks are pirated in some foreign countries.

He told of an experience of the Eagle Pencil Company. This company has its trade-mark, the word "Eagle" with a picture of an eagle, registered all over the world.

The company shipped some of its pencils to one of the South American countries before registering its trade-mark there.

A man who knew the good will value of the company's emblem had gone to that country and registered the trade-mark for himself.

When the Eagle Pencil Company's cargo of pencils arrived, it was confiscated. Under the trade-mark laws of various lands, no trade-mark which is an infringement of a trade-mark already registered in the country is allowed to pass the customs. For more than twenty years, the Eagle Pencil Company was in litigation over the matter without gaining the slightest degree of redress.

Frequently, the good will betokened by a trade-mark—and often inseparable from it—is estimated in terms of millions of dollars.

Although the Trade-Mark Act of 1920 affords legal protection for the good will embodied in a trade-mark and opens the way to foreign registration thereof, it is beyond the province of the act to stop the turning of domestic good will into ridicule or gibberish or ill will in a foreign market.

In other words, a trade emblem which is graphic and persuasive in this country may be obscure, repellent, or a laughing stock in another country. This may come to pass as a consequence of difference of language or clash of racial custom or religious beliefs. For example, in the tailoring industry there is a prosperous American firm bearing the name of "Bobo and Company." It is conceivable that this firm might want to use the name "Bobo" as a trade-mark for its goods in Latin America. No difficulty would be encountered in securing Federal registration for the name in this country after it had been used in interstate commerce for one year. Nevertheless, it would not be advisable to register the name as a trade-mark in any of the Spanish-speaking republics, because "Bobo" in Spanish means dunce, dolt, fool, simpleton.

Furthermore, a particular trade-mark may be free from everything which would militate against its prestige in foreign markets

and yet be so designed as to be denied registration in another land.

This may happen when the trade-mark is so composed that its units are not intimately blended. A citizen of the foreign country may obtain registration for himself of the several distinct parts of such a trade-mark and thus prevent the use of the composite trade-mark—except upon payment of blackmail to him.

It is apparent, therefore, that American manufacturers who wish to sell their goods in foreign markets need something more than legal protection for their trade-marks. They require the knowledge and services of a competent agency to make a study of the trade-mark with reference to its fitness for general use in export business and to find out first and foremost whether or not it sufficiently meets the requirements for ample protection in this country. The practice of relying upon common-law rights is robbed of much of its former excuse now that the Patent Office has opened the door to registration of practically all "common-law" marks.

ABSTRACTED AND REPRINTED ARTICLES

ELDRIN, A NEW PLANT CONSTITUENT.*

By John Uri Lloyd, Ph.M.
CINCINNATI, OHIO.

For thirty or forty years in the experiments I have made with drugs, plants and plant structures, I have met continuously the fact that linked with each plant texture there was something present that under the influence of an alkali gave a yellow color. For example, strip a paw-paw of its bark and touch the white inner surface with a solution of potash—now it turns yellow. There is probably one rule in this as elsewhere, and that is the rule of exceptions. I hope to find one white blossom that will not turn yellow. If I do, the exception may be of help to the botanist, for it may be the forerunner of a class distinction.

* Portion of an address on Plant Constituents delivered at the meeting of the Ohio State Eclectic Medical Assoc., May 18, 19, 20, 1920; reprinted from the *Eclectic Medical Journal*, Dec., 1920.

For years this yellow phenomenon was before me, but I could not catch the material that produced it. About a year and a half ago I decided that if I isolated this yellow something that pervaded all plant tissues so linked with impurities as seemingly to defy isolation, it must be obtained from something that is white, something that does not carry a mass of extraneous material to contaminate the principle desired. Then it occurred, why not use the petals of a *white* flower to get this *yellow* something?

The elder was then in bloom. These, I found, turned deep yellow with ammonia gas. I procured fifty pounds of elder flowers, put them in a percolator, made a tincture, and worked it by means of neutral solvents and excluders, to rid the product of the alcohol, chlorophyl and wax. I had five gallons of the chlorophyl-free liquid, and said to Mr. Miller, who was assisting me: "Place the jar in a cold situation, and tomorrow morning I shall examine it." Next morning I tipped the jar very carefully, and all down the sides were little white concretions about the size of pin heads. It was the thing I have been seeking forty years.

I took one of those pin heads to the laboratory and dropped it into distilled water and it did not dissolve. I added ammonia—behold! it immediately dissolved, the liquid turning deep yellow. It was only the size of a pin head, but there were thousands of them. And they kept increasing in size. The marvelous phase of this subject is, I got eleven ounces (crude) of that substance out of that fifty pounds of elder flowers. Before that, by reason of faulty research, I could not get a grain from anything.

The first thought of a pharmacist is, what value a new substance may have in medicine. Alas, the greater part of my work has been the repeated finding of something that had no value. I sent some of this material to Prof. R. Adams Dutcher, University of Minnesota, requesting that he make a physiological examination of it. His preliminary report was to the effect that, according to a preliminary investigation, it had no physiological action. May I not ask, should a peculiarity of action be expected of a substance pervading plant tissues everywhere?[1]

In this cylinder I have distilled water, and I propose to put

[1] I had vitamines in mind, there was reason to hope that a general life supporter of plant life, serviceable to animals, could be found and isolated. Not a poison of energetic action. This, I accept, Dr. Dutcher demonstrated as a fallacy in the direction of this substance.

into the water a small amount of this material. Note that it settles to the bottom. It is perfectly insoluble. One grain shaken with a gallon of water apparently disappears, but if let stand until the next day, behold, it is all at the bottom. I now shake the mixture, and pour half of it into another cylinder, then add a little ammonia waer—note the change in color, to deep yellow. A very delicate reagent is it for an alkali. Let us now make both liquids yellow. Into one I pour diluted sulphuric acid, in excess, to destroy the ammonia. The liquid becomes colorless.

Now the question came to me, "Why is the white flower white when it has the yellow material in it in such quantity?" Then I figured to myself it must be because the white petals carry also an acid which in contact with the yellow material makes it white. In other words, would the white flower be yellow if there was an alkali in the petal instead of an acid? Crushing the flower in a mortar with a little distilled water gave a sharp acid reaction. Blue litmus turned red at once. The acid was present.

The question arises, What is the use of this thing in nature? I think I comprehend the subject, but it is too great to try to bring before you today.

I am going to ask you to be charitable in what I have said concerning the theories I now hold. I may be right and I may be wrong. We can see this color change and we know that the petals hold organic acid. What of it? I don't claim that anything I have brought is new; quite the contrary. So far as I know, this experiment has not been made. In some literature unbeknown to me it may be explained. It doesn't matter whether it is new or old—it is a phase in plant economy that is a fact, and may be of service other than as a medicine.

I asked myself, Why the material could not be used to make a test paper? Why would not paper saturated with a solution of this material turn yellow with alkali and colorless with acid? I tried it and it worked. There is a shade between red and blue litmus which makes it difficult sometimes to quite determine the end-reaction. There is no intermediate shade with this.

For example, let us now pour into these tumblers some water, and into the one put some ammonia and in the other dilute sulphuric acid. The paper I hold in my hand has been saturated with a weak solution of this material and dried. I dip it into the acid.

See, it is colorless. Now I dip it into the ammonia; it instantly turns yellow.

You ask the name of this material. I call it *Eldrin.* But it may have been long known elsewhere and recorded under a different name or different terms.

CHAULMOOGRA OIL DERIVATIVES.*

Chaulmoogra oil is one of the few members of the group of fatty oils which are believed to have distinct physiological effects outside of their nutritive value. The fatty oils are of great physiological importance, but, heretofore, chiefly in relation to nutrition and the general metabolism of the body. In a series of papers from the Wellcome Research Laboratory, by Power and his collaborators, the constitution of chaulmoogra oil and some of the closely related oils was elucidated. They discovered a new series of fatty acids represented by two members—chaulmoogric acid, $C_{18}H_{32}O_2$, and hydnocarpic acid, $C_{16}H_{28}O_2$. These acids differ from any other known fatty acids in that they rotate the plane of polarized light to a notable degree—chaulmoogric acid $(a)d = +62.1°$ and hydnocarpic acid $(a)d = +68°$. The studies on their constitution indicated that each of these acids contains a five-carbon-ring nucleus. Both of these acids were isolated from chaulmoogra oil derived from the seeds of *Taraktogenos kurzii,* and also from the oil of closely related species belonging to the genus *Hydnocarpus.* Power and his co-workers did not concern themselves with the therapeutic use of chaulmoogra oil.

It would appear possible that the distinctive action of chaulmoogra oil, as heretofore reported, may be due either to the glycerides of the unique fatty acids of chaulmoogra oil or to the presence of some other oil-soluble constituent not a glyceride. The first step in the attempt to identify the active agents would be the separating of chaulmoogra oil into fractions and the use of these fractions on groups of lepers. The separating of the glyceride mixtures which make up the various vegetable fatty oils is very difficult; the fatty

* Abstract from Public Health Reports, Volume 35, No. 34, the United States Public Health Service, prepared by Joseph W. England.

acids obtained by the decomposition of the glycerides are somewhat more readily separated.

Sir Leonard Rogers, in his experiments using the intravenous injections of the sodium salts of the acids derived from chaulmoogra oil, made use of fractions, separated by Ghosh. The data presented by Ghosh showed clearly that he was dealing with mixtures of fatty acids, and probably very complicated mixtures. The separation of the constituent fatty acids from the mixed product derived from the saponification of chaulmoogra oil by means of fractional crystallization is a tedious and complicated task, and Ghosh did not meet with much success.

It is quite clear from the results heretofore published that although there is a therapeutic agent (or agents) in chaulmoogra oil of marked value in leprosy, none of the attempts to isolate or identify this agent has led to conclusive results.

A recent publication of Sir Leonard Rogers describes the use of "gynocardate of soda" and "morrhuate of soda." His term "morrhuate of soda" refers to the sodium soaps of the fatty acids of cod liver oil, and he reports excellent results from the intravenous and hypodermic injections of this material. The fatty acids of cod liver oil are of a peculiar and unusual type, although not of the chaulmoogric series. If the results of Rogers are confirmed, it will appear that the fatty acids of cod liver oil are also useful in leprosy. Although it may be, as suggested by Rogers, that "other unsaturated fatty acids may also be expected to yield effective preparations against the acid-fast bacilli of both leprosy and tuberculosis," it seems to us unlikely that this is a property common to all unsaturated fatty acids. For example, oleic acid, which is unsaturated to the same extent as chaulmoogric acid, is a common body constituent, and it would therefore be rather improbable that weekly injections of, say 5 Cc. of a 3 per cent. solution of sodium oleate amounting to 0.15 gram dry material, would have any such effect in leprosy as has been reported following the use of even smaller quantities of the sodium soaps of the fatty acids of chaulmoogra oil. Obviously a wide and important field for chemical and physiological investigation has been opened by this work of Sir Leonard Rogers and our own work here.

As an initial step, the fatty acids of chaulmoogra oil were separated into four fractions in the chemical laboratory of the College of Hawaii. One of these fractions was chaulmoogric acid and the

other three were mixtures of acids having somewhat different properties. These fatty acid fractions are solids, and therefore unavailable directly for hypodermic or intramuscular injections. One of the first problems was to find a suitable form of material for injection which would allow rapid absorption into the circulation. It was found that the ethyl esters of the fatty acids were thin fluid oils lending themselves readily to intramuscular injections and were readily absorbed.

The four fractions originally tried out, and designed, respectively, "A," "B," "C" and "D" were of the following character:

Fraction "A": The ethyl ester of chaulmoogric acid.

Fraction "B": The ethyl esters of the other fatty acids readily separating on cooling the alcoholic solution of the mixed fatty acids of chaulmoogra oil, doubtless containing considerable of "A."

Fraction "C": The ethyl esters of the fatty acids remaining in the mother liquor from the separation of the acids in "A" and "B" and yielding lead salts readily soluble in ether.

Fraction "D": Ethyl esters of the fatty acids accompanying "C" in the alcoholic separation, but yielding lead salts not readily soluble in ether.

The early results of the use of these fractions "A," "B," "C," and "D," together with some details of the methods of their preparation, are given by Hollmann and Dean.

The results published and a continuation of the same line of work led to the general conclusion that the therapeutic agent in chaulmoogra oil is able to survive the chemical treatments involved in the making of these preparations and is itself distributed through all four of the fractions. The differences in results, using the different fractions, are not sufficient to warrant any final conclusions regarding their relative efficiency; patients receiving each of the fractions have shown marked improvement, have become bacterially negative, and have been paroled. It is impossible, however, to draw definite conclusions from this work because of the fact that all patients who received the injections also regularly received chaulmoogra oil by mouth in substantial quantities. We cannot say therefore, whether the beneficial action in any particular case is due to the material injected or to the combined action of the material injected and that taken by mouth. The general observation that Chaulmoogra oil taken by mouth has a beneficial but not decisive action lends color to the belief that the most important factor in

the improvement of the various cases is the injected material. As a series of experiments intended to develop the best method for leprosy treatment the plan followed was satisfactory, but it is not satisfactory as a method of demonstrating the relative efficiency of different fractions of the oil.

DISTILLED ESTERS.

As already indicated, the processes which resulted in the fractions "A," "B," "C," and "D" are of such a character as to make it improbable that any other material except fatty acids would survive them and be distributed in all four of these fractions. Still further evidence on this point was gained by a different system of fractionation. In this case the mixed fatty acids derived from the saponification of chaulmoogra oil were converted into ethyl esters by heating with absolute alcohol in the presence of dry hydrochloric acid gas, giving a mixture of the ethyl esters of all the acids present in the crude oil. This acid mixture was distilled in vacuo at a pressure of 30 to 34 mm. The distillate was cut into three fractions of different boiling ranges, designated "E," "F" and "G." These distilled esters are colorless liquids. At the time the first work of this character was done no apparatus was available to provide higher vacua and allow satisfactory distillations. The fractions "E," "F" and "G," were used for intramuscular injections in a number of patients, beginning in January, 1919, and in some cases extending until about the 1st of July of that year. It was found that all the cases receiving each one of the fractions "E," "F" and "G" showed improvement—some of them quite rapid—indicating that the methods employed in their production had not resulted in the destruction of the therapeutic agent or agents.

The same uncertainty surrounds the interpretation of these results as exists in the cases receiving fractions "A," "B," "C" and "D" since all were getting chaulmoogra oil in capsules three times daily in addition to the weekly injections. We can say, however, that whatever virtue resides in the use of chaulmoogra oil derivatives injected intramuscularly in combination with the oral administration, that virtue is probably not lost or segregated to an appreciable extent by any of the chemical or physical conditions to which these various preparations have been exposed.

The use of vacuum distillation as a means of separating the esters of the fatty acids and the fatty acids themselves is receiving extensive application in the further chemical investigations now in progress.

ON THE USE OF POKE ROOT IN MEDICINE.*

By E. M. Holmes, F.L.S.

My attention was recently directed to the use of this plant in cancer of the breast, and on looking up the statements concerning it, I have been surprised to find how vague the therapeutic action of the drug appears to be, and how little is known of its active principles. Squire, in the "Companion to the British Pharmacopœia," states that in large doses it is emetic, purgative, and slightly narcotic. Martindale, in the 17th edition, 1920, of the "Extra Pharmacopœia," ascribes emetic, cathartic, and alterative properties to it, and refers briefly to its use for painful mammæ. In the "Year-Book of Pharmacy, 1896," p. 120, a quotation from the *Med. Chim.*, n.s. III, p. 288, is given, in which a Dr. Goodman states that he has obtained very good results in the treatment of epithelioma, with fresh leaves of the plant applied in the form of a plaster. The application is said to be painful but quite free from danger, and exercises a very marked destructive action on the morbid tissues. Stillé and Maisch ("National Dispensatory," 4th edition, p. 1154), state that the most probable evidence in favor of the medicinal powers of the plant relate to its use in rheumatism and diseases of the skin; and mention is also made of the alleged statement that it prevents and relieves mammary inflammation after delivery; and also that, according to Rutherford, the resin is a powerful hepatic stimulant.

In a homœopathic work by E. H. Ruddock (1879), entitled "Homœopathic Vade Mecum," it is described as a remedy for inflammation. swelling; hardness, and morbid sensitiveness of the breast, also for boils; and in a footnote it is stated that the plant is in constant use in the dairies of America to disperse caking, or inflammatory enlargements of the udders of cows, and that it has

* From *The Pharm. Jour. and Pharmacist*, Nov. 6, 1920.

been most successfully used in the human female, even after suppuration of the gland has set in and sinuses have been formed.

That *Phytolacca decandra* possesses active properties there can be no doubt, and its physiological action and its chemical constituents seem worthy of careful investigation. Trimble, in *Amer. Jour. Pharm.,* June, 1893, obtained from the root a constituent which appeared to be a saponin with acid properties, as it caused much frothing when shaken with water, was precipitated from alkaline solution by dilute sulphuric acid, and acted as a sternutatory. Four years later G. B. Frankforter and F. Ramaley (*Amer. Jour. Pharmacy,* 1897, pp. 281-290) found in the root about 1 per cent. of a resin, an acid, combined and free, calculated as formic acid, and obtained indications of the presence of an alkaloid, existing as a salt as well as in the basic condition. An English wholesale herbalist tells me that herbalists regularly send to him for the fresh root, which they sell as a remedy for tumors and cancer of the breast, and that a lady who is the daughter of a veterinary surgeon has a regular practice in the treatment of tumors with poke root, and that he himself has given it to persons suffering with swelling and tumors with the happiest results. He has used the fresh root in the form of a poultice, kept wet with the tincture, and covered with oiled silk, till a good crop of pustular sores are produced, when the tumor will resolve. He is willing to supply the fresh root to any qualified medical practitioner who will give it a fair trial in mammary cancer. There seems to be sufficient evidence that the root, besides possessing emetic, cathartic, and cholagogue properties, acts as a discutient for tumors. That it deserves a careful investigation as to its chemical constituents is evident from the way in which they act, especially the saponin, which may possess special haemolytic actions. Any remedy which promises the possibility of relief for any form of cancer is certainly worthy of trial.

THE CULTIVATION OF BUCHU.*

The cultivation of buchu in South Africa is dealt with in the *Imperial Institute Bulletin* (Vol. xvii, No. 4), in the course of which the measures taken to prevent the wholesale destruction of

* From *The Chemist and Druggist,* Nov. 13, 1920.

the plants is indicated, similar information having been given in this journal from time to time. Although these measures will doubtless help to preserve the wild plants from extermination, there is no question that the best way to obtain a continuous and regular supply of the leaves is by cultivating the plants. A further advantage of cultivation is that it would ensure the leaves being marketed in a pure state. At present the three standard forms of buchu are sometimes found to be adulterated with leaves of other species of *Barosma,* while those of *Empleurum serrulatum* are occasionally present in considerable quantities in parcels of long buchu (*B. serratifolia*). Cultivation experiments with buchu have been made from time to time by private persons (see, for example, *Agric. Jour. Union of S. Africa,* 6:80, 1913), and more recently experiments with *B. betulina* have been conducted at the National Botanic Gardens, Kirstenbosch, particulars of which are given in the *South African Journal of Industries* 2: 748, 1919. From this account it appears that seed was sown in 1914 in four plots situated in different positions on the slopes of Wynberg Hill. At the base of the slope, where the soil consisted mainly of a black, sandy alluvium, which was occasionally flooded during the winter, only a few seeds germinated at the driest end, and those did not survive the first winter. The best results were obtained on a plot in an open, sunny position well up the slope of the hill. Here the soil was a red, gritty loam, rich in iron and deficient in lime, the subsoil being dry and consisting of clay containing a large quantity of quartz grit, with here and there a seam of ironstone gravel. In June, 1916, a further sowing was made at this spot in rows four feet apart, the land being trenched and no manure added. About 80 per cent. of the seed germinated in this case, which was much higher than in any previous sowings. The germination, however, was slow. Seed was also sown in tins in a nursery, to supply plants for filling gaps in the plantation, but not more than 20 per cent. germinated. The seed shown *in situ* was not watered, and rain fell on only two days in the first fortnight, whereas the surface soil in the nursery was kept moist by watering. It appears, therefore, that the seed dislikes much moisture during germination. When twelve months old the seedlings were thinned out, and some were transplanted but not more than 10 per cent. succeeded. When two years old the plants sown in 1916 were from twelve to eighteen inches high, very bushy, and some of them flowered and seeded. It is suggested that

the best method of harvesting is to cut the whole plant back to near the crown when 18 months old, and thereafter annually, cutting each season a little above the previous year's cut. By this method a harvest is obtained every year, and the yield should gradually increase. It would be necessary, however, to allow a number of plants to grow on and flower, in order to obtain seed for the renewal or extension of the plantation. The yield of dry leaves from a row of 80 yards long, cut in May, 1918—that is, when the plants were about two years old—was 8½ lbs. With rows four feet apart this is equivalent to a yield of about 400 lbs. per acre. It is stated that the growth of the plants subsequent to being cut back was entirely satisfactory, and none of them died. The results obtained in the experiments at Kirstenbosch indicate that under suitable conditions the commercial cultivation of buchu should prove a success. *B. betulina,* the most valuable kind, alone should be grown. The plant is particularly adapted to dry conditions, and may be cultivated on sunny hillsides, where other crops will not succeed.

THE PROGRESS OF MICROBIOLOGY.*

In common with all the natural sciences, microbiology passed through an empirical stage. For it is only in mythology that Minerva springs forth a finished product from the brow of Jove. Jenner's discovery of vaccination as a prophylactic for small-pox was an inference from a fact of observation—namely, that persons who had once been infected with cow-pox seemed to enjoy immunity from small-pox. Neither Jenner nor his immediate successors reached any rationale of the process by which this protection is effected. It was not until Pasteur and his school demonstrated the casual relationship between the specific living organisms and disease, that microbiology became entitled to rank as a science, and the ground was clear for the introduction of sero-therapy and vaccine-therapy which have since made such rapid strides as scientific methods for the prevention and cure of disease. According to Metchnikoff's theory of phagocytosis, the white blood corpuscles are engaged in a perpetual campaign against the microbic invaders of the blood-stream, which if not destroyed or rendered innocuous may do dire

* From *The Pharm. Jour. and Pharmacist,* Sept. 4, 1920.

mischief to, or bring about the downfall of, the living human body. But there are also elements in the blood-stream which react upon the bacillary and other organic poisons which may be absorbed into it. These elements form the so-called antibodies, which by chemically combining with the virus neutralize it. According to the current theory these antibodies may be reproduced and persist in the blood for an indefinite period. Jenner believed that a single attack of cow-pox or a single vaccination protected the subject for the rest of his life, an expectation falsified even during Jenner's own lifetime. No one can now say for certain how long the protective period lasts. And this uncertainty prevails also as to protection from other diseases for which special vaccines, stock or autogenous are used. If the results of his recent researches are confirmed, Dr. Besredka, of the Pasteur Institute, has made a remarkable discovery which puts an entirely new complexion on the accepted view of immunization. He finds that while the infusion into the blood of the living germ which cause a disease, such as bacillary dysentery, does not, contrary to theory, produce acute general toxæmia, it produces exactly the same effect locally upon the bowels as if the germs had been taken into the system by the mouth. And the result is the same whether the germs are hypodermically or intravenously injected. While a single injection of dead dysentery germs have after a lapse of 18 days increased the amount of antibody 400 times, it was found that after two injections, at an interval of 8 days, the antibody had disappeared from the blood. The inference is that microbes, living or dead, have a selective affinity for certain tissue systems or definite areas in these, and that the protective mechanism is formed not in the blood-stream but locally in the site susceptible to the given disease. Dr. Besredka's experiments show that as regards typhoid, dysentery, paratyphoid, and similar infections, "vaccination is only efficacious when the vaccine finally reaches the intestine or certain zones of it. The mode of vaccination to be preferred is the oral route; it gets to its required position directly and with a maximum of security." Thus administered there is no local irritation, such as sometimes occurs at the site of a hypodermic injection. Both rabbits and mice which swallowed the dead germs were "solidly protected." Some of the lay newspapers in their references to Dr. Besredka's discovery wrongly assumed that vaccination *per se* would be of general application. So that vaccination by the skin against small-

pox is to be superseded by a dose of calf lymph taken by the mouth. But this is going beyond what is written. Dr. Besredka's researches have reference exclusively to localized infections, and it is doubtful whether immunization from diseases of the type of small-pox—which is distinguished by general constitutional disturbance and an eruption all over the body—can be secured by ingestion of vaccine lymph. If Dr. Besredka's conclusions are established they will not invalidate the first principles upon which serotherapy and vaccine-therapy are founded, and his method has the undoubted advantage of simplifying and otherwise improving the technique for the administration of prophylactics—microbic in their nature or origin.

BENZYL ALCOHOL FOR TOOTHACHE.[1]*

By David I. Macht, M.D.,

BALTIMORE, MD.

In 1918, I[2] announced my discovery of the local anesthetic properties of benzyl alcohol, or phenmethylol, and published both pharmacologic and clinical data on the subject. I found that solutions of that drug in concentrations of from 1 to 4 per cent. by volume, in physiologic sodium chloride solution or in distilled water, furnished a satisfactory local anesthetic for general surgical work, on the one hand, and that benzyl alcohol was at least forty times less toxic than cocaine, on the other. It was found that solutions of phenmethylol produced efficient anesthesia, especially when infiltrated in the tissues, either alone, or, still better, combined with small doses of epinephrine. On application to mucous membranes, solutions of benzyl alcohol produced also a distinct anesthetic effect, but the anesthesia is very superficial and does not penetrate into the deeper layers of the tissues. It was found that a much better anesthesia of mucous or skin surfaces could be produced by application of pure benzyl alcohol. Pure benzyl alcohol cannot be injected

* From *Jour. Amer. Med. Assoc.*, October 30, 1920.

[1] *Pharmacological Laboratory of the Johns Hopkins University.*

[2] Macht, D. I.: *J. Pharmacol. & Exper. Therap.*, 11: 263 (Apr.) 1918.

into living tissue for the same reason that pure ethyl alcohol cannot be administered in that way: it leads to local necrosis. When applied to mucous surfaces, however, the drug is not irritating and produces a marked anesthetic effect.

I undertook experiments with a view of enhancing the penetrating power of benzyl alcohol when applied to mucous or skin surfaces. It was found that when the drug was mixed with certain lipoid solvents, the local anesthesia after its application extended more deeply below the surface. Among the most satisfactory of such solvents were found to be xylene and chloroform, especially the latter.

In the present note I wish to call the attention of the general practitioner to a very satisfactory minor use of benzyl alcohol. I have found, as have others, that benzyl alcohol either alone (100 per cent.), or, still better, when mixed with an equal part by volume of chloroform, furnishes a most efficient anodyne for toothache, when introduced on a pledget of cotton into a tooth cavity, or applied to an exposed nerve. The relief obtained by the use of such drops is marked and almost instantaneous, and is also long-lasting. I am not aware of any other drug, with the exception of cocaine, which is more efficient in relieving toothache. As benzyl alcohol is the least toxic of all the well-known local anesthetics, the repeated and free use of such a combination as was described above is free from the objections which are raised by the employment of cocaine, and it can be administered with impunity even to small children. It is for this reason that it was deemed worth while to publish this note in order to advise the medical practitioner of a simple remedy for the relief of one of the most excruciating forms of pain.

PIEDMONTESE PEPPERMINT OIL.*

Next to the essential oils of lemon and orange, that obtained from peppermint enjoys a high reputation among the numerous volatile oils produced by Italy. Sig. Michelletti, the editor of the "Rivista Italiana delle Essenze e Profumi," contributes to "La Parfumerie Moderne," October, 1920, an interesting account of his re-

* From *The Chemist and Druggist*, Oct. 30, 1920.

cent visit to Vigone and Pancalieri, the centers of the cultivation, and also of the distillation of peppermint in the province of Turin. This district, which the author designates as the "Mitcham of Italy," yields annually about eleven million kilograms of peppermint, from which 25,000 to 27,000 kilograms of essential oil are obtained. The extensive cultivation of peppermint in Piedmont is of recent date, and is due to the action of a French distiller, M. Honoré Carles, who, observing that the locally-grown peppermint gave a very poor yield of essential oil, had ten bags of Mitcham-quality plants sent from England, which he distributed in 1900 to the growers of Pancalieri. The plants throve remarkably well, and may now be regarded as a special variety, indigenous to that district. The oil distilled from these plants, and sold under the designation of "Piedmontese Peppermint Oil," or, better, as "Italo-Mitcham Peppermint," is now acknowledged to be one of the best in the world, on account of the delicacy of its perfume and the sweetness of its aroma. This variety of peppermint yields about 1 kilogram of essential oil for every 400 kilograms of plants submitted to distillation. This year witnessed a normal harvest, but the price paid for peppermint was excessive. Whereas distillers had been prepared to pay 24 to 25 lire per 100 kilograms, the growers raised the price to 30 lire. This unexpected advance in price is due to the fact that the distillers work independently of each other, each trying to obtain from the growers the largest possible quantities of mint, promising them higher prices. Thus the growers succeeded this year in making a profit of 100 per cent. by taking full advantage of the competition among the distillers. A suggestion of the author to form a syndicate received a very unfavorable reception from the distillers, in view of the conflicting interests among the latter.

All the oil distilleries visited by the writer worked continuously, day and night, for a period of twenty-five days. The most important are: R. Subinaghi & Co., which possesses eight distilling plants, with a capacity of 400 kilograms each; Barbero-Rosso & Co., with two large plants of 650 kilograms each, and six of 350 kilograms, both of which are at Vigone. At Pancalieri there is the factory, already alluded to above, of H. Carles, with twelve distilling plants, of a capacity of 250 kilograms each; he also possesses another distillery, with four average-size plants, at Polonghera. The distillery of Sig. G. Varino, now managed by his son, is the oldest one producing peppermint oil in Italy; Sig. Varino, who died this year,

created this branch of industry in 1871. His factory has seven distilling plants of 400 kilograms each, in addition to two other factories, at Lombriasco, with five, and another at Polonhera, with four distilling plants. There are also a number of other distilleries, of minor importance, scattered throughout this district, such as Galasso Andrea, Rittatore, Barberi & Co., Ubertino Vignolo, etc. In conclusion, Sig. Micheletti insists upon the necessity for the Italian Government to promote more actively this branch of national industry, and points to the recent French Lavender Congress (*C. & D.*, Sept. 11, 1920, p. 68), as an example in point.

IPECACUANHIC ACID.*

An exhaustive study of ipecacuanhic acid has been made by R. Huerre (*Jour. Pharm. Chim.*, June 1, 1920), which affords a valuable contribution to our knowledge of this substance. In view of the extensive use made of emetine in the treatment of amoebic dysentery. it is interesting to note that the author attributes the curative value of de-emetinized ipecacuanha solely to its content of ipecacuanhic acid. The presence of this acid in ipecacuanha was already recognized in the French Codex of 1818, when Pelletier believed it to be gallic acid. It was first isolated by Wiiligk, in 1850, by means of lead subacetate; Wehmer, in 1911, described it as a glucoside, a view shared by Kobert. The method adopted by Huerre for isolating ipecacuanhic acid consists in exhausting the powdered drug with twenty times its weight of boiling distilled water, in four successive extractions. The collected liquids are filtered and evaporated to double the weight of the drug employed. This residue is again filtered and an excess of ammonium sulphate added. The precipitate is separated by filtration and washed with a saturated aqueous solution of ammonium sulphate, and then treated with alcohol (90 per cent.). The alcoholic extract is submitted to distillation, and when all the alcohol has been removed on cooling, the ipecacuanhic acid separates out from the residue, which consists of a

* From *The Chemist and Druggist*, Oct. 9, 1920.

saturated aqueous solution of ammonium sulphate. It is then brought into solution by the addition of alcohol, after removing the water, filtered, and the alcoholic filtrate is evaporated to dryness. The product thus obtained still contains traces of ammonium sulphate, which can be removed by means of neutral lead acetate, which does not precipitate the ipecacuanhic acid, and then using lead subacetate and sulphuretted hydrogen. It occurs as a reddish, amorphous, very hygroscopic powder, with a bitter taste, soluble in water, alcohol, and ether. With ferric chloride it yields a green coloration, which changes into violet on the addition of ammonia. The author found that ipecacuanha root contains from 3 to 4 per cent. of ipecacuanhic acid, and further that the various official alcoholic preparations of this drug contain the total amount of acid present in the drug.

THE DISTRIBUTION OF ACETONE IN THE BODY.*

In certain conditions, both physiologic and pathologic, acetone may be present in the organism in amounts not negligible. At times it becomes a matter of considerable importance to obtain dependable information about them. While it is circulating in the blood stream, acetone may appear in the urine and expired air. The view that the acetone substance—acetone, aceto-acetic acid and beta-oxybutyric acid—are derived in large part from improper and incomplete metabolism of fats in the body has been generally accepted. The importance of careful observations of ketosis, as well as the abnormalities of carbohydrate transformation in the organism of the diabetic, is daily being better appreciated by discriminating clinicians, so that perversions in the metabolism of fat are receiving far more attention than in the past. There is no more potent agency in the prevention of ketosis and the acidosis related to it than the withdrawal of fat from the diet, wherefore Joslin [1]

* From *Jour. Amer. Med. Assoc.*, Nov. 6, 1920.

[1] Joslin, E. P.: "Treatment of Diabetes Mellitus," Philadelphia, 1917, p. 281.

has trenchantly remarked that fat at one time may save the life of the diabetic, but at another may destroy it.

Widmark [2] has recently demonstrated at the physiologic institute in Lund, Sweden, that free acetone belongs to the group of substances that can with the greatest ease penetrate living cells. Hence they diffuse readily throughout the organism and tend to avoid undue concentration at any locality or in any special tissue. Acetone itself passes into the urine by the process of diffusion; hence the concentration of this compound in the blood and urine is usually the same. Aceto-acetic acid (diacetic acid), to which the well-known ferric chloride urinary test of Gerhard is attributable, depends on the characteristic secretory functions of the kidneys for its elimination; consequently its concentration is commonly higher in the urine than in the blood.

It also appears from the observations of Widmark [3] that the elimination of acetone through the lungs is a pure diffusion process. From his data there is no reason to suppose that any secretion of the volatile compound takes place, such as has at times been assumed for the passage of certain gases through the alveolar membranes. From a simple determination of the concentration of acetone in the alveolar air, so commonly collected nowadays in the estimation of carbon dioxide factors, it is possible to secure an accurate calculation of the free acetone concentration of the blood. Widmark points out that accordingly in a diabetic, by combined blood estimation and analysis of alveolar air, one may arrive at an understanding of the relationship between the free acetone and the total acetone in the blood. The method, he adds, has this great advantage, that the relationship between the acetone and the aceto-acetic acid can in no way be disturbed by the analysis; the separation of the free acetone from the aceto-acetic acid is effected, so to speak, with the organism itself as distillation apparatus. The ability to differentiate and estimate the various ketone substances with accuracy, as is already accomplished for the sugar in the blood and urine of glycosuric patients, is likely to prove helpful in the clinic of diabetes.

[2] Widmark, E. M. P.: "Studies in the Acetone Concentration in Blood, Urine and Alveolar Air. II. The Passage of Acetone and Aceto-Acetic Acid into the Urine," *Biochem. J.*, 14: 364 (July) 1920.

[3] Widmark, E. M. P. *Ibid*, p. 379.

CURRENT LITERATURE

MEDICAL AND PHARMACEUTICAL NOTES.

FATAL CASE OF AMYLENE HYDRATE POISONING.—Jacobi and Speer report what, as far as they know, is the only case of fatal tertiary amyl alcohol poisoning on record. Six grams of amylene hydrate as an enema had been prescribed for an epileptic, age 22, as he was having series of seizures that did not respond to bromides or other remedies. Twenty-two hours later, it was discovered that through a mistake of the nurse the patient had been given 35 c. c. in place of 6 gm. The twenty-fourth hour edema of the lung and cardiac insufficiency were present. After the forty-second hour, gastric hemorrhage occurred (about one litre of a black, coffee-ground-like substance). Shortly afterward the reflexes returned, beginning with the plantar reflex. The intoxication seemed to be overcome, but seven hours later death occurred, accompanied by a rise of temperature. Ancker reported in 1892 a woman's attempt at suicide by taking 27 gm. of amylene hydrate, approximately the same amount that this patient received. The woman recovered, and the writers think that their patient would in all probability have recovered from the intoxication if it had not been for the severe complication of influenzal pneumonia. (From *Therapeutische Halbmonatshefte, Berlin,* through *Jour. Amer. Med. Assoc.,* December 4, 1920.)

ACTION OF SODIUM OLEATE ON GONOCOCCUS.—Sodium oleate was found by Davis and Swartz to have a definite germicidal value for the gonococcus. This value is increased, where uncoagulated protein is present, by the addition of 0.5 boric acid. The presence of small sublethal quantities of sodium oleate, 1:8,000, increases the germicidal action of many drugs against the gonococcus. With others it is without effect. Sodium oleate with boric acid is suggested as an adjuvant to other drugs in the treatment and prophylaxis of gonorrhea. (From *Jour. of Urology, Baltimore,* through *Jour. Amer. Med. Assoc.,* December 11, 1920.)

EUCALYPTUS LEAVES FOR DIABETES.—As the result of a paper published in the *Revue horticole d'Alger,* the treatment of diabetes by infusion of eucalyptus leaves has been frequently tried. Dr. Perez, in a communication to the author, says that after reading of the good effect produced by the drug many experiments had been made, and complete success attained; he did not think there were any more cases of diabetes in the island (Teneriffe). A very marked aphrodisiac action was also observed. Dr. Trabut has himself frequently prescribed it with very favorable results. A decoction of 10 to 15 gm. of leaves in 500 c. c. of water is employed, but a liquid extract would probably be a more convenient preparation. (*Bull, Gen. de Therap.,* 171 : 428; through *The Pharm. Jour. & Pharmacist,* September 18, 1920.)

FATAL POISONING WITH METHYL BROMIDE.—Goldschmid and Kuhn relate that after a kettle containing 178 kg. of methyl bromide had exploded, the men resumed work in the room, noticing merely a transient aromatic odor. There were absolutely no symptoms at first, but the second day afterward two or three of the men complained of dizziness or unstable balance, and the room was evacuated for twelve days. Then work was resumed and the men left that evening in apparent health, but one was found dying on the street, and two others presented similar symptoms in a day or two; with only a brief prodrome, epileptiform convulsions developed suddenly, with loss of consciousness and pulmonary edema, fatal in a few hours. Six others were treated in the hospital for dizziness, headache, loss of balance and general depression, but there was no disturbance in vision, no nausea, no vomiting, and the blood findings were normal. The men regained their earning capacity, but still showed, eight months later, occasional tremor of the hands and tongue, and the Romberg sign was weakly positive. The clinical picture thus differed from that of the few cases of methyl bromide poisoning on record. Necropsy revealed acute changes in the ganglion cells of the cortex in each fatal case. Pulmonary edema and suppurative bronchitis were found also in the one case examined. (From *Zentralblatt fur Gewerbehygiene, etc., Berlin,* Feb., 1920; 8, No. 2, through *Jour. Amer. Med. Assoc.,* Oct. 16, 1920.)

INDICAN IN SERUM AS TEST OF KIDNEY FUNCTIONING.—The indican content and urea content of the blood serum of forty patients with different diseases are tabulated to show the variations with dieting and other factors, and the importance of hyperindicanemia for the prognosis. With the simple test described, it is possible in every case of uremia to obtain deeper insight into conditions and foresee the outcome. Haas accepts 1.4 mg. per liter as the limit of the normal range; Rosenberg's limit is from 1.5 to 1.8 mg. The urea and the indican content do not run parallel, although when there is uremia there is usually indicanemia, and in one case hyperindicanemia was found before the uremia developed. In one case of contracted kidney the urea was at first 1.17 per thousand, the indican, 1.7 mg. per liter, the figures on repeating the tests were 1.06 and 1.08 urea and 6.4 and 21.3 mg. indican. This patient had been kept on a protein-poor diet. In another similar case the urea figures were 1.46, 1.04 and 0.52 per thousand on repeated tests, while the indican figure kept persistently at 4.27 mg., thus testifying that the condition was grave, although the urea content was normal. Both of these patients died within a short time with uremic symptoms. The protein-poor diet reduced the uremia but did not modify the hyperindicanemia, and the latter was thus the true basis for prognosis. (From *Nederlandsch Tijdschrift v. Geneeskunde, Amsterdam;* through *Jour. Amer. Med. Assoc.,* October 23, 1920.)

BENZYL BENZOATE IN HYPERTENSION.—Benzyl benzoate has been shown to be a powerful vasodilator, without being depressant to the heart when administered by mouth in small doses. Owing to this property Macht found it to be effective in the treatment of hypertension and angina pectoris. The best method of administering the drug in such cases is in alcoholic solution, which admits of rapid absorption and control of the dose. A 20 per cent. alcoholic solution of benzyl benzoate was administered by mouth, either in cold water or milk. The ordinary dose was found to be 20 or 30 drops of such a solution, taken three or four times a day. After administering to a patient full doses of benzyl benzoate and obtaining a desirable therapeutic effect, the reduced pressure could be maintained by keeping a patient on very small doses of the drug, sometimes no more than 5 minims of the 20 per cent. solution. The effect of benzyl benzoate on the blood pressure was demonstrable

even in such cases in which nitrites failed to produce a vasodilation. (From *New York Medical Journal,* Aug. 28, 1920, through *Jour. Amer. Med. Assoc.,* Sept. 11, 1920.)

TREATMENT OF ITCH BY ALCOHOLIC SOLUTION OF BETANAPHTHOL.—If alcohol is used as the vehicle for applying betanaphthol as a parasiticidal agent, it enables the latter to come into close contact with its intended object. The solution penetrates into the folds of the skin, into the tracks of the sarcoptes, into the spaces and into the intercellular interstices of the epidermis. It dissolves the fats in the capillary spaces and is absorbed into these. The solution kills the parasite, and prevents further infection of all kinds. The alcohol should be 94% or more. For an adult the proportion of betanaphthol for use should be 7 to 10%, according to the state of the skin; and this can always be diluted to 5% for patients with deep lesions, produced by scratching, in whom the stronger solution would cause pain. The itching usually disappears after the first application, because betanaphthol has an anæsthetic effect, and this may be increased by the addition of 1% of menthol. The skin should be dry, and the lotion applied by means of a swab, moistened in it; this is passed carefully over the whole surface of the skin without rubbing. The application is made twice daily for two or three days. (From *The Pharm. Jour. and Pharmacist,* Sept. 4, 1920.)

CORRESPONDENCE

PROGRESS OF THE PHARMACOPŒIAL REVISION.

Philadelphia, January 1, 1921.

TO THE EDITOR:

A summary of the activities of the Committee of Revision of the United States Pharmacopœia, tenth revision, covering the first six months, accompanies this note.

It is a definite policy of the Committee of Revision to make public its decisions and invite comment. As the revision progresses, all important decisions will be announced and the members of the

committee will welcome comments from any one who is interested in the revision.

It is difficult for those who are not closely affiliated with the work to appreciate the enormous mass of detail which must be considered, but I am happy to say that from my experience in previous revisions I am confident that the work is progressing satisfactorily and with a notable speed and earnest determination on the part of the members to bring it to the earliest possible conclusion.

Very truly yours,

E. FULLERTON COOK,
Chairman.

PROGRESS OF THE PHARMACOPŒIAL REVISION.

About six months having passed since the Pharmacopœial Convention in Washington and the election of the Committee of Revision, a brief outline of the work of the committee during this period is presented, carrying out the idea of publicity, which is a well-defined policy of the work of revision.

The personnel of the Revision Committee was fully reported at the time of the convention and also the fact that in the personal conferences which immediately followed the election of the committee, an organization was perfected which permitted the immediate start of the revision.

The sub-committees, with their chairmen, differ slightly from those of the last revision, two new sub-committees being created and other sub-committees being consolidated.

The sub-committee on Bio-Assays and on Reagents and Test Solutions, formerly taken care of as the work of other sub-committees, were considered important enough to be established as new divisions of the work.

The appointment of the sub-committees, their organization and election of chairmen and the appointment of these chairmen as the members of the Executive Committee during the Washington conferences, were subsequently approved by the vote of the Committee of Revision and the Board of Trustees, as required by the by-laws of the convention.

The Executive Committee and sub-committees are as follows:

Chairmen of Sub-Committees and Members of the Executive Committee.	Sub-Committees.	Number of Each.
E. Fullerton Cook, Ph. M., Chairman of the Executive Committee.		
1. H. C. Wood, Jr., M. D.	No. 1—*Scope* (Admissions and Deletions). Barbour, Bastedo, Beringer, Christian, Craig, DuMez, Edmunds, Fantus, Fussell, Hamburger, Hatcher, Hodge, Hunt, LaWall, Leonard, Rowntree, Seltzer, Sollmann, Stitt, Wood, Zeigler.	21
2. Torald Sollmann, M. D.	No. 2—*Therapeutics and Pharmacodynamics* (Posology). Bastedo, Fussell, Sollmann, Wood.	4
3. C. W. Edmunds, M. D.	No. 3—*Bio-Assays.* Anderson, Barbour, Edmunds, Hatcher, Houghton, Hunt, McCoy, Pittenger, Zeigler.	9
4. George W. McCoy, M. D.	No. 4—*Bio-Products and Diagnostical Tests.* Anderson, Edmunds, Houghton, McCoy, Pittenger, Stitt.	6
5. Henry Kraemer, Ph. D.	No. 5—*Botany and Pharmacognosy.* Alsberg, Dye, Gathercoal, Kraemer, Newcomb, Richtmann, Schneider.	7
6. Charles E. Caspari, Ph. D.	No. 6—*Proximate Assays.* Caspari, Dohme, Eldred, Havenhill, Johnson, Ruddiman, Scoville.	7
7. H. V. Arny, Ph. D.	No. 7—*Inorganic Chemicals.* Alsberg, Arny, Bradley, Caspari, Clark, Eldred, Havenhill, Jordan, LaWall, Murray, Rosengarten.	11
8. George D. Rosengarten, Ph. D.	No. 8—*Organic Chemicals.* Arny, Caspari, Clark, Dohme, Johnson, Jordan, Murray, Rosengarten.	8
9. C. H. LaWall, Ph. M.	No. 9—*Reagents and Test Solutions.* Arny, Bradley, Clark, Eldred, LaWall, Murray, Nitardy, Rosengarten.	8
10. W. O. Richtmann, B. S.	No. 10—*Volatile Oils.* Alsberg, Dohme, Gathercoal, Johnson, Richtmann.	5

Chairmen of Sub-Committees and Members of the Executive Committee.	Sub-Committees.	Number of Each.
11. G. M. Beringer, Ph. M.	No. 11—*Extracts, Fluidextracts, Tinctures.* Beringer, Francis, Havenhill, Kelly, Nitardy, Ruddiman.	6
12. Wilbur L. Scoville	No. 12 — *Waters, Solutions, Spirits, Syrups, Elixirs.* Beringer, Culley, Dye, Fantus, Kelly, Ruddiman, Scoville, Seltzer.	8
13. Jacob Diner, M. D.	No. 13—*Cerates, Ointments and Miscellaneous Galenicals.* Culley, Diner, Dye, Francis, Kelly, Seltzer.	6
14. Theodore J. Bradley, A. M.	No. 14—*Tables, Weights and Measures.* Bradley, Caspari, Diner, DuMez, Jordan.	5
15. A. G. DuMez, Ph. D.	No. 15—*Nomenclature.* Craig, DuMez, Kraemer, Newcomb, Fantus, Schneider, Stitt, Wood.	8

Another feature of the Washington conference was the consideration by the Sub-committee on Scope of the articles official in the U. S. P. IX. It was understood that all those articles for which there was no negative vote cast for admission to the U. S. P. X. would be reported at once for inclusion in the new Pharmacopœia. Material was thus provided for immediate revision. The Sub-committee on Scope within a short time reported about five hundred titles for admission and these articles have been before the various sub-committees for some months.

Scope. A significant action taken at the Washington conference related to the policy to be followed by the Committee of Revision concerning admissions. There were many of those on the committee who believed that the final decision on admissions, so far as therapeutically useful substances were concerned, should be left to the medical members of the committee. Others believed that this decision should be subject to the majority vote of the entire committee and the matter was thoroughly discussed and the following motions finally approved:

"In questions concerning the inclusion of substances of therapeutic usefulness in the Pharmacopœia, the entire body of physicians on the Committee of Revision shall have the deciding vote."

"In all questions regarding the inclusion of substances of pharmaceutic necessity, the entire body of pharmacists on the Committee of Revision have the deciding vote."

When the Washington conference had adjourned several members requested that this action on Scope be reconsidered by mail and an opportunity was again given to every member of the committee to present arguments. These were published in full in the committee circulars and a new vote taken. Again the motions were approved by the committee. The practical operation of this decision resulted in immediately placing before the committee the decisions of the Sub-committee on Scope. This consists of a list of those substances now in the U. S. P. IX., which are approved for admission and also the names of such new articles as may be deemed worthy of recognition. Members of the Committee of Revision are invited to comment upon the reports on Scope, and if there is a question raised concerning the decisions of the sub-committee, the articles under discussion will be reconsidered by all of the physicians of the Revision Committee, their vote is to be accepted as final. It should be explained that the Sub-committee on Scope consists of the seventeen representatives nominated by the medical members of the convention and also includes three pharmacists. There are at least six additional physicians on the Revision Committee and these will have a vote on all substances which must be reconsidered.

The reports of the Sub-committee on Scope will also be published in journals at a suitable time, that physicians and pharmacists may have an opportunity to express their opinion concerning the reported admissions or deletions and all of these comments will be placed before the committee before the final vote.

The motions, as will be observed, provide for the original decisions on therapeutically useful substances through the vote of the Sub-committee on Scope, with the final decision, if the original report is questioned, left to the vote of the physicians of the entire committee. In the same manner the inclusion of those substances of pharmaceutical necessity are left to the pharmaceutical members of the committee for final decision.

At the personal conferences the Revision Committee also adopted rules of procedure for the conduct of business in the committee, following very closely the rules in force during the last decade.

Considerable criticism had been received concerning the use of "mils" in the Pharmacopœia, and as the term had not been

adopted among chemists and the Bureau of Standards had recommended the use of the abbreviation "cc" as the standard abbreviation for cubic centimeters, the committee has voted to use "cc" in the new Pharmacopœia. The French spelling of the word "gramme" was also criticised and the committee decided to adopt the American standard spelling "gram." The theoretical argument that it might be mistaken for "grain" in prescription writing was considered unworthy of serious consideration, as no physician writes the word "gram" on a prescription.

ORGANIZATION OF THE CHAIRMAN'S OFFICE.

Soon after the convention the chairman's office was organized in Philadelphia. The necessary supplies, consisting of stationery, envelopes, binders and general equipment, were provided, and in August, 1920, the Board of Trustees authorized a rental of an office for the work. Here are concentrated all phases of revision activity and in this office are being mimeographed and issued the "Circulars" of the General Committee, the "Letters" of the Executive Committee, and the "Bulletins" of practically all of the sub-committees. There have already been placed before the various committees over six hundred pages of circular material.

SUB-COMMITTEES.

Every sub-committee is organized and at work. First reports on texts have appeared in some of the sub-committees and others are about ready to send in their first revised texts.

SPECIAL SUB-COMMITTEES.

The convention authorized the establishment of two special sub-committees, one on drug markets and the other to study and establish standards for permissible quantities of gruffs and trailings, resulting from the grinding of drugs. These two special sub-committees have been made subsidiary committees to the Sub-committee on Botany and Pharmacognosy, and Dr. Carl L. Alsberg has accepted the chairmanship of the work on Drug Markets and Professor E. L. Newcomb, of the Special Committee on Gruffs and Tailings.

AUXILIARY WORKERS.

As the number of the members of the Committee of Revision is limited, it was not possible for all those interested in the revision to be elected to the committee, but their assistance and co-operation in the revision of the Pharmacopœia was considered of great importance. Therefore the committee voted to invite the co-operation of auxiliary members to the several sub-committees. This action having been approved by the Board of Trustees, a number of auxiliary members have been nominated by sub-committee chairmen and approved by the Revision Committee and Board of Trustees. These associate members will take part in sub-committee activities but without vote or honoraria. Those on the first list are given below, and others have since been nominated:

Biological Products and Diagnostical Tests:

Prof. Wm. H. Park,	New York City
Dr. James P. Leake,	Washington, D. C.
Dr. John N. Force,	Berkeley, Cal.

Inorganic Chemicals:

Dr. Lyman F. Kebler,	Washington, D. C.
Dr. Wm. G. Crockett,	Richmond, Va.
Prof. Jeannot Hostman,	New York City.
Dr. Hugo H. Schaefer,	New York City.
Dr. Gaston DuBois,	St. Louis, Mo.
Dr. Virgil Coblentz,	New York City.
Dr. S. P. Sadtler,	Philadelphia, Pa.
J. P. Snyder,	Norwich, N. Y.
Prof. Joseph L. Mayer,	New York City.
Dr. W. F. Hillebrand,	Washington, D. C.

Organic Chemicals:

Joseph Rosin,	Philadelphia, Pa.

Reagents and Test Solutions:

W. D. Collins,	Washington, D. C.
Joseph W. Ehman,	Philadelphia, Pa.
Ralph R. Foran,	Philadelphia, Pa.

Cerates, Ointments and Miscellaneous Galenicals:

William A. Hall,	Detroit, Mich.
Dr. Gustave Horstman,	New York City.
Otto Canis,	New York City,
J. L. Lascoff,	New York City
Dr. Curt Wimmer,	New York City.
Dr.Wm. C. Anderson,	Brooklyn, N. Y.
Edwin C. Hutman,	Albany, N. Y.

Nomenclature:

E. J. Crane, Editor of *Chemical Abstracts,* Columbus, Ohio.
Dr. Arno Viehoever, Bureau of Chemistry, Washington, D. C.
Oliver A. Farwell, of Parke, Davis Co., Detroit, Mich.

Botany and Pharmacognosy:

Chas. M. Sterling,	Lawrence, Kans.
Mr. Butters,	Minneapolis, Minn.
Anton Hogstad, Jr.	Brookings, S. D.
Philip F. Fackensthall,	Richmond, Va.

Gruffs and Tailings (sub-group under Botany and Pharmacognosy):

E. L. Newcomb (Chairman),	Minneapolis, Minn.
C. L. Alsberg,	Washington, D. C.
George E. Ewe,	Philadelphia, Pa.
John Moser,	Baltimore, Md.
G. A. N. King,	Minneapolis, Minn.
Henry Kraemer (*ex-officio*),	Mt. Clemens, Mich.

COMMENTS AND SUGGESTIONS.

All of the comments or criticisms of the U. S. P. IX. which were available, either through the Digest of Comments of the Public Health Service, or as submitted to the convention or to the committee within recent months, have been tabulated and placed before the Committee of Revision and the sub-committee chairmen. A letter has recently been sent to many of those interested in the Pharmacopœia, either as manufacturers of pharmaceuticals or chemicals or dealers in pharmacopœial products, again inviting suggestions, and any one who is in position to offer an improve-

ment for any pharmacopœial drug, chemical or preparation, or for other requirements of the Pharmacopœia, is invited to send this at once to the chairman, who will see that it is properly considered.

PUBLICITY.

From time to time important decisions of the committee and a report of the progress of the revision will be made public through the chairman's office, so that all may follow the work of revision. When revised texts have followed their regular course of sub-committee consideration, Executive Committee study, and are finally before the General Committee, an abstract of the proposed changes will also be published, giving every one who is interested an opportunity to know the new standards before they are actually printed. This plan was found of much value in the last revision and is fully in keeping with the policy of the present Committee of Revision.

BOOK REVIEWS

"DICTIONARY OF EXPLOSIVES," By ARTHUR MARSHALL. XIV, 159 pages. P. Blakiston's Son & Co., Philadelphia, Pa., 1920.

The appearance of this little book is timely, as it has been twenty-five years since the publication of the last book of this kind —that by Cundill and Thomson, and during this time, especially during the past few years, there has been great activity in the development of commercial and military explosives. In his little "Dictionary" Mr. Marshall has given in concise form such information as is usually contained in Government bulletins on the various types of explosives having special or trade names. In individual cases the following facts have been given: Use, manufacturer, date of permit (or whether permissible), composition, limit, charge and power (as indicated by the ballistic pendulum). In the case of some of the British explosives this information is fairly complete, but in the case of American, German, French and other explosives the information is usually meager.

Preceding the dictionary proper there is a classification of explosives into the following groups:

Coal mine explosives, blasting explosives, high explosives, mis-

cellaneous explosives and propellants. The first group, coal mine explosives, is sub-divided according to the country producing them. The numbers listed under the names of the different countries give a good idea of the prominence which the author naturally extends to British explosives throughout the book. These numbers follows: American, 32; Austrian and Hungarian, 4; Belgian, 22; French, 5; German 47 and British 99. In the list of propellants only four out of the sixty-six mentioned are of American make.

Following the dictionary proper there is an "index" of explosive ingredients which lists under the name of each ingredient, the names of the explosives, in this book, containing it. This index is of value in showing the extent of the use of each ingredient.

In spite of its incompleteness as regards American and German explosives, Marshall's Dictionary will be of considerable interest and value to manufacturers of and dealers in explosives, as it includes many of the new explosives which have proved a commercial success.

CHARLES E. VANDERKLEED.

"LABORATORY EXPERIMENTS IN ORGANIC CHEMISTRY." By E. P. COOK, A. M., Associate Professor in Smith College. 2d Ed., 79 pages, 8 illustrations. $1.00 net. P. Blakiston's Son & Company Philadelphia, Pa.

This book is designed especially for use with Stoddard's "Introduction to Organic Chemistry. The experiments are those proven most suitable for a first course in organic chemistry and illustrate and emphasize the more important class reactions, both as to the manufacture and testing of members of the several classes of organic compounds.

Only experiments that will "work" are claimed to be given. Equations have been omitted, it being considered best to allow the student to work them out for himself with the aid of his text-book. Reference is made to seven other books for details of some operations. The procedure outlined for the conduct of the experiments is concise and generally easily followed. Interspersed with the explanations are numerous questions designed to draw from the student what he is doing and seeing, and thus impress indelibly on his mind the salient facts and significance of his work.

F. P. STROUP.

TRAVAUX DU LABORATOIRE DE MATIERE MEDICALE DE L'ÉCOLE SUPERIEURE DE PHARMACIE DE PARIS, Vol. XI, 1917-1919. Publishers, Vigot Frères, Paris.

The volume before us contains a series of theses contributed as researches from the Materia Medica Laboratory of the School of Pharmacy of the University of Paris. These are arranged in five parts:

The first is a study of the histological characteristics of the natural woods of Madagascar and a comparison of these with the principal woods used in the industries in Europe. This thesis has been prepared by André Gérard. In the consideration of each specimen the history, macroscopic characteristics, the microscopic examination of sections, the physical properties and the technical uses are carefully described. The botany of the wood and the source from which each authentic sample examined by the student was obtained, the synonyms and vernacular names employed in the country from which obtained, the habitat and bibliographical references are given with each description. The cellular structure, as shown by sections of the wood and bark, is well described and the illustrations furnished in each case demonstrate these characteristics nicely. The cellular contents and the physical and chemical properties are also generally stated.

This monograph of about 160 pages is ended with tables setting forth the chemical properties of these woods, their indigenous names and botanical classifications.

The second part of the book is a thesis on the Alkaloidal Content of Cultivated Belladonna, submitted to the University of Paris by Frederic Beausite for the diploma of Doctor in Pharmacy.

The author carefully reviews the literature and methods for the preparation of the extract of belladonna, the various methods for its assay, the effect of soil constituents, climatic conditions and the time of cultivation. These questions are exhaustively considered in this thesis.

The third part is devoted to a thesis on the Java Coca, being a monograph on the history, botany, chemistry and pharmacology, by Mlle. Emma Reens, likewise submitted to the University of Paris for the diploma of Doctor in Pharmacy. It appears that *Erythroxylon Coca* has become an important article of cultivation and commerce in Java and likewise in Ceylon. Statistical data as

to the amounts exported of both the leaf and alkaloid are given in tables. A careful review of the chemistry of the alkaloids of coca leaves with special consideration of that cultivated in Java is given in Chapter 3 of this dissertation. The other constituents of the leaves such as tannin and essential oil are described.

Chapter 4 is devoted to the methods of extraction of the alkaloids and Chapter 5 is devoted to the galenical preparations of coca and a comparative examination of these. In these the preparations official in the various pharmacopœias are given.

Chapter 6 considers the rational preparations of extracts of coca, and Chapter 7 the solutions of cocaine hydrochloride and their sterilization.

The author considers that the coca cultivated in Java is the *Erythroxylon Coca* var. *Spruceanum,* while that of Ceylon is principally Huanuco and both these are varieties of *Erythroxylon Coca* Lamarck.

The anatomical structure of the Java leaf is described and cross sections, the upper and lower surfaces are illustrated.

The fourth part of this book is a thesis on the methods of micro-chemical research upon certain constituents of essential oils, submitted for the "Doctor" degree by René Baudry. Numerous plates show the various types of crystals obtained in his investigations and excellently illustrate this study. The author has given considerable attention to determining the localization of essential oils in aromatic plants by the aid of reagents. This examination covers a variety of plants and parts thereof, such as leaves, flowers, seeds and denotes specially the characteristic micro-chemical reactions obtained with the anthranilate and the methylanthranilate of methyl.

A bibliographical index concludes this thesis.

The fifth part, concluding the publication, is composed of a series of abstracts covering a variety of subjects, including stick-lac, preparation of cat-gut ligatures, lixiviation, preparation of potassium and sodium soaps, the utilization of the oleoaginous residues from the seeds of Meliacea and the preparation and uses of surgical soaps.

The work throughout exhibits a high class of research in pharmacy.

G. M. B.